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Pharmaceutical and Analytical Insights into KaidaryaAsava: From Formulation to Therapeutic Relevance

Dr Apurva Chandrakant Karande[1], Dr Vishal Nandurkar[2], Dr Raman Belge[3]
[1]*M.D. Scholar, Department of Rasashastra and Bhaishajya Kalpana, Shri Ayurved Mahavidyalaya, Nagpur.*
[2] *P.G. Guide, Associate Professor, Department of Rasashastra and Bhaishajya Kalpana, Shri Ayurved Mahavidyalaya, Nagpur.*
[3]*Professor & H.O.D., Department of Rasashastra and Bhaishajya Kalpana, Shri Ayurved Mahavidyalaya, Nagpur.*

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ABSTRACT

Background

The ancient principle, "Medicine is food and food is medicine," reflects the longstanding use of plants for therapeutic purposes. Murrayakoenigii (curry leaf), often termed the "magical plant of Indian spices," has served both as a culinary agent and a traditional remedy across diverse tribal and folk systems of medicine. With global interest in plant-based therapeutics rising, Ayurveda continues to offer a wide range of formulations, among which Asava and Arishta occupy a significant place due to their self-generated alcoholic fermentation. This natural fermentation enhances phytoconstituent extraction, bioavailability, and formulation stability. Although Murrayakoenigii is well-recognised for its antioxidant, antimicrobial, hepatoprotective, antidiabetic, and hair-strengthening properties, no classical Asavaformulation utilising curry leaves exists in Ayurvedic literature.

Aim& Objective

To prepare and preliminarily evaluate KaidaryaAsava, a novel fermented Ayurvedic formulation incorporating Murrayakoenigii as the principal ingredient for hair and scalp health.

Materials &Methods

The formulation was prepared following classical Sandhana Kalpana principles. Procedures included raw drug, vessel fumigation (dhoopana), pre-soaking of curry leaves to enhance extraction, controlled fermentation, and the addition of PrakshepaDravyas for therapeutic synergy and stability. Fermentation progress and completion were monitored through Sidhi Lakshana.

Results

KaidaryaAsava showed characteristic features of a standard Asava, including moderate self-generated alcohol, desirable organoleptic properties, and acceptable physicochemical profiles. The fermentation process was efficient, and the product exhibited stability and favourable extractive qualities.

Conclusion

KaidaryaAsava emerges as a promising internal hair tonic with potential benefits in strengthening hair roots, preventing premature greying, controlling dandruff, and improving scalp health. Given its pharmacological potential and the absence of similar classical formulations, KaidaryaAsava represents a valuable innovation for contemporary Ayurvedic practice. Further phytochemical, pharmacological, and clinical studies are recommended to substantiate its efficacy and broaden its therapeutic applications.

Keywords –Kaidarya, Asav-Arshita, Hair growth, Fermentation, Curry leaves

I. INTRODUCTION

The utilisation of plant-based natural products for disease prevention, therapeutic intervention, and health promotion has increasingly captured the interest of both researchers and the general public. Medicinal plants, owing to their wide availability, cost-effectiveness, and comparatively minimal adverse effects, serve as an important resource for the development of novel bioactive compounds.[1,2]Traditional herbal medicine has historically formed the foundation of healthcare systems across many Asian countries, with roots extending back to ancient civilisations where plant materials were employed in diverse dosage forms. The rapid progress in identifying and isolating pharmacologically active constituents from medicinal herbs has markedly influenced contemporary medical and pharmaceutical practices.[3]India possesses an extensive diversity of medicinal herbs, many of which contain a wide range of biologically active compounds beneficial for promoting health and managing various diseases. A significant portion of the population continues to rely on herbal medicines, as they are

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generally regarded as safe, effective, and economically accessible. Murrayakoenigii (commonly known as Curry leaves, Kadhi Patta, Mitha Nimba, or Giri Nimba) is indigenous to India and is extensively distributed throughout the Indian subcontinent, except in the higher altitudes of the Himalayan region. The plant is enriched with a diverse array of bioactive phytoconstituents, possessing significant disease-preventive and therapeutic properties, which position it as a promising natural source for the development of novel, alternative, and innovative medicinal agents. It is a staple ingredient in Indian cuisine, widely appreciated for its subtle aroma and flavour, and is routinely incorporated into daily cooking.[4]

For centuries, natural products have been a fundamental source of sustaining human health. Even today, they continue to gain importance as alternative medicines and as sources of pharmacotherapeutic agents, either through direct use or via the isolation of bioactive compounds with demonstrated biological activity. Over the past few decades, the use of herbal products has witnessed a significant resurgence of interest.[5]In Ayurveda, the branch of Bhaishajya Kalpanaencompasses the science of pharmaceutical preparations. Bhaishajya Kalpanaaddresses a wide range of formulations, including primary preparations such as Panchvidhya Kashaya Kalpana, as well as secondary preparations like Churna (powder), Sneha (medicated oils), Avaleha(linctus), and Asava and Arishta (alcoholic formulations). Among these dosage forms, “Sandhana Kalpana” holds a special place, as it involves the preparation of acidic and alcoholic fermented formulations. According to classical texts, these medicines are produced by preserving liquid base drugs, such as juices or decoctions, under controlled conditions to allow natural fermentation. These fermentative preparations are classified as Asava and Arishta based on their method of preparation. While several classical texts describe the preparation of fermented formulations, Sharangadhara Acharya offers a systematic differentiation between Asava and Arishta. According to his classification, Asava are formulated without boiling, generally utilising Swarasa(fresh juice) or Hima (infusion), whereas Arishta are prepared from decoctions.[6]It is noteworthy that many of the earlier formulations do not conform to this clear-cut distinction, implying that the formalisedcategorisation of Asava and Arishta emerged at a later stage in the development of Ayurvedic pharmaceutics.Both Asava and Arishta represent self-generated herbal fermentations in the traditional Ayurvedic system.

Importance of Asav-Arishta

- These formulations exhibit high stability over time.
- The medicinal properties of Asava and Arishta improve with ageing.
- Fermented extracts demonstrate therapeutic effects even at low doses.
- The aqueous nature of these extracts facilitates enhanced absorption of bioactive compounds by target organs.
- Fermentation improves the extraction efficiency of active constituents from herbs and enhances their bioavailability and delivery in the body.
- The constant presence of low-concentration alcohol may detoxify certain phytochemicals while increasing the potency of others.
- Fermentation also reduces plant toxicity and contamination by breaking down cell walls with bacterial enzymes, aiding the release of bioactive compounds.
- These formulations are moderately alcoholic (up to ~12% by volume), generally sweet with slight acidity, and possess a pleasant aroma.
- Standardisation of Asava and Arishta involves evaluating physicochemical parameters such as total solids, specific gravity, pH, density, extractive value, viscosity, surface tension, and refractive index.

Beyond physical benefits, proper hair care also enhances confidence and self-esteem, as healthy hair plays a vital role in overall appearance and personal expression. In recent years, there has been increasing interest in hair care products such as shampoos, conditioners, hair oils, and serums, which are primarily applied externally. While herbal cosmetics offer a promising natural alternative, challenges remain in selecting ingredients that are genuinely natural and in formulating products that match the effectiveness of their synthetic counterparts.This study, however, emphasises the role of internal herbal therapy through a hair tonic derived from Murrayakoenigii (curry leaves). Traditionally, this tonic can be used to strengthen hair shafts, prevent premature greying, and reduce hair thinning.

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II. AIM & OBJECTIVE

To prepare and preliminarily evaluate KaidaryaAsava, a novel fermented Ayurvedic formulation incorporating Murrayakoenigii as the principal ingredient for hair and scalp health.

III. MATERIALS AND METHODS

The practice of fermentation can be traced throughout the history of Indian civilisation, from the Vedic period to the present day. Traditionally, the evaluation of drugs during and after production relied on subjective parameters, whereas today, the quality of finished formulations is assessed using a range of analytical and advanced biotechnological techniques.[7]

The pharmaceutical preparation of Asava is accomplished in three distinct phases: (1) the pre-preparatory phase, (2) the main phase in which Asava is formulated, and (3) the final phase, involving completion of the product and its proper storage.

Table No.1 - Ingredients

Ingredients	**Latin name**	**Part used**	**Quantity**
Kaidarya	Murrayakoenigii	Patra	5 kg
Dhataki	Woodfordiafruticosa	Pushpa	500g
Jaggery / Gud	-	-	-
PrakshepDravyas			
Twak	Cinnamomun Zeylanica	Twak	200 g
Ela	Cardamom	Pods	100g
Pippali	Piper Longum	Fruit	250 g

Instruments: Vessels, Gas stove, Stirring rod, Measuring cylinder, Cloth (for filtration), Sandhan Patra,Weighing balance,

I. The pre-preparatory phase

1. Collection of Raw Drugs**:** All ingredientsrequired for the formulation were collected in the specified quantities. Care was taken to ensure that the raw materials were free from foreign matter, residual contaminants, and pesticides.

2. Fumigation of Fermentation Vessels (Dhoopana): The fermentation vessels were subjected to dhoopana, a fumigation process designed to prevent the growth of naturally occurring microorganisms that might contaminate or disrupt the fermentation.

3. Soaking of Kaidarya: The Kaidarya was soaked overnight to prepare it for the subsequent fermentation stage, a process that enhances the extraction of active constituents into the Kashaya (decoction) and thereby increases the formulation's potency.[8]

II. Preparation of Asava–It includes foursteps

i. Preparation of KaidarayaKwath –

For the preparation of the fermentation medium for KaidaryaAsava, Kaidarya Patra Kwatha was prepared in accordance with classical Kwatha Kalpana procedures. In this process, 5 kg of fresh Kaidarya leaves were selected, cleaned, and used for decoction preparation. The leaves were thoroughly washed to remove dust and impurities, then coarsely crushed (Yavakuta) to facilitate optimal extraction.

The crushed material was placed in a stainless-steel vessel, and sixteen times the quantity of water (80 litres) was added. The mixture was allowed to soak for 1–2 hours to ensure adequate hydration of the plant material. Following soaking, the vessel was heated on a controlled flame and boiled with intermittent stirring. The heating continued until the volume was reduced to one-eighth of the initial quantity, yielding 10 litres of Kaidarya Patra Kwatha.

Once the desired reduction was achieved, the decoction was removed from the heat and filtered through clean muslin cloth to obtain a clear and uniform Kwatha. The freshly prepared 10 litres of Kaidarya Patra Kwatha was then immediately utilized as the primary liquid medium for the subsequent formulation of KaidaryaAsava.

ii. Preparation of Dhataki Pushpa Phanta

To prepare the fermentation inoculum, 500 g of Dhataki Pushpa (Woodfordiafruticosa flowers) were carefully cleaned and placed in a stainless-steel vessel. Four litres of freshly boiled water were poured over the flowers to prepare a classical Phanta (hot infusion).

The vessel was promptly covered with a clean cloth and left undisturbed for 4–6 hours, allowing thorough extraction of the bioactive constituents as well as the natural fermentative microorganisms present in the flowers.

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After the designated infusion period, the mixture was filtered through clean muslin cloth, yielding about 2 litres of clear Dhataki Pushpa Phanta. This freshly prepared infusion served as the fermentation inoculum for the preparation of KaidaryaAsava.

iii. Preparation of Asava

For the preparation of KaidaryaAsava, 10 litres of the previously formulated Kaidarya Patra Kwatha were transferred into a thoroughly cleaned Sandhana Patra. Subsequently, 6 kg of sieved and finely powdered jaggery were added, and the mixture was stirred continuously until complete dissolution was achieved.

Following this, 2 litres of freshly prepared Dhataki Pushpa Phanta were incorporated to provide the natural inoculum required for fermentation. The contents were mixed uniformly, and the mouth of the Sandhana Patra was covered with a clean, tightly secured cloth to maintain anaerobic conditions while preventing external contamination.

The vessel was then placed undisturbed in a warm, shaded environment for a period of 30 days. Periodic observations were made to assess the progression of fermentation, with attention to classical indicators such as the cessation of frothing, reduction in gaseous activity, and the gradual clarification of the supernatant layer. Upon confirmation of complete fermentation, the clear Asava was carefully decanted, ensuring separation from the sedimented residue at the bottom.

iv. Addition of Prakshep Dravya

After the completion of fermentation, the clear supernatant of KaidaryaAsava was carefully decanted and passed through a clean filtration medium. The filtered product was then transferred into a sterile stainless-steel vessel for subsequent processing.

At this stage, an additional 2 kg of jaggery was incorporated to improve palatability and contribute to the stability of the formulation. The jaggery was mixed thoroughly until it dissolved completely. Following this, the PrakshepaDravyas were added in the specified quantities: Twak (200 g), Ela (100 g), and Pippali (250 g). The mixture was stirred well to ensure uniform dispersion of these aromatic and therapeutic additives.

The vessel was then kept undisturbed for a period of seven days to allow sufficient maceration and extraction of the volatile and active constituents from the PrakshepaDravyas into the fermented medium.

III.Final Phase

Upon completion of the 7-day maceration period, the Asava was filtered once more through clean muslin cloth to obtain a clear, homogeneous product. The final KaidaryaAsava was subsequently stored in airtight, amber-coloured glass bottles to protect it from light and ensure stability during further evaluation.

Significance of Asava and Arishta:

Asavaand Arishta formulations hold a unique position among the Madhya Kalpanas and other preparation methods described in Ayurveda. Their rapid therapeutic action and superior preservative qualities make them highly valued among all Ayurvedic formulations. During fermentation, alcohol and carbon dioxide are naturally produced through chemical transformations. The sugars present in the formulation are partially converted into alcohol, which not only aids in the dissolution of active constituents into the liquid medium but also acts as a self-generated preservative, protecting the bioactive compounds from microbial degradation and thereby maintaining their efficacy over an extended period.[9]

Significance of Sandhan Dravya (Fermentor):

In the fermentation process, the fermentor acts as a repository for microorganisms. In Sandhana Kalpana, the Dhataki Sandhana Dravya (fermentor) plays a crucial role in catalysing the conversion of starches or sugars into alcohol through enzymatic activity. The flowers of Dhataki contain an endogenous invertase enzyme, fructofuranosidase, which facilitates the hydrolysis of sucrose to produce alcohol—the final product of Sandhana Kalpana. Madhura dravyas, such as jaggery, serve as the carbohydrate source to initiate fermentation. The rate of fermentation and the quality of the final product depend on the nature and concentration of carbohydrates. Classical texts by Acharya Charaka and Acharya Sharangdhar recommend a 39–40% carbohydrate content as optimal for the fermentation process. Consequently, the alcohol produced is self-generated, contributing to a longer shelf life and enhanced therapeutic efficacy due to faster absorption in the gastrointestinal tract.[10]The easy and early fermentation process is initiated by adding only 40% of the total sweetening agent, with the

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remaining portion incorporated after the fermentation process has begun.[11]

Fermentation Time:

The duration of fermentation varies with the season and climatic conditions. According to classical literature, fermentation typically takes 6 days during autumn and summer, 10 days in winter, and 8 days during the rainy and spring seasons. In general, hot tropical climates require 7–10 days for fermentation, whereas cooler regions may need up to 30 days. Overall, depending on the specific formulation, the fermentation period can range from 7 to 180 days.[12,13]

Significance of Additives - Prakshepadravya

PrakshepDravyas are ingredients added after the primary preparation of a formulation. They serve multiple purposes, including enhancing therapeutic efficacy, improving taste and aroma, or acting as colourants. In the present preparation, powdered forms of Dalchini, Ela, and Pippali are used to improve stability, palatability, and overall appeal. Beyond their pharmaceutical role, prakshepdravyas support the pharmacological activity of the main ingredients, contribute to the taste, fragrance, and consistency of the formulation, and enhance patient compliance. They may also produce a synergistic effect, reduce potential side effects of other components, facilitate absorption and assimilation of herbal actives, and act as eliminators to prevent the accumulation of toxins or metabolic waste in the body.[14]

Sidhi Lakshana (Signs to identify the completion of Process)-

1.No audible sound was perceptible when the ear was placed against the vessel.
2. All prakshepdravyas had settled at the bottom of the container.
3. A lit match placed inside the vessel continued to burn.
4. The liquid developed the desired flavour, colour, and aroma.
5. A small sample collected in a glass test tube was clear; if any particles were present, the fermentation was considered incomplete, and the vessel was capped to allow the process to continue.[6],[15]

Table No.2 - Observations (Process of Fermentation)

Observation	Initial Stage	During Fermentation	On Completion
Effervescence	No effervescence observed	Effervescence with a bubbling sound was observed	No effervescence observed
Alcohol	No alcoholic odour	Mild alcoholic odour detected	A distinct alcoholic odour is present
Burning Candle	The candle extinguishes inside the container	The candle extinguishes inside the container	The candle continues to burn near the fermented media due to the presence of alcohol
Temperature	Constant	Slight increase of 1–2°C	Reduced to approximately 32°C
Lime Water Test	Formation of bubbles	Formation of bubbles	No changes observed

Table No. 3 –Pharmaceutical Evaluation

Sr.no	Ingredients	Qunatity
1	KaidaryaKwath	10 L
2	Dhataki Pushpa Phanta	2 L
3	Jaggery	8kg
4	Prakshep Dravya	550g
5	Final Output	8.5 L

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Analytical Profiling[16]

KaidaryaAsava was subjected to both organoleptic and physicochemical evaluations to establish its quality profile.

a) Organoleptic Properties

In accordance with the standards outlined in the Ayurvedic Pharmacopoeia of India, KaidaryaAsava was assessed for its colour, taste, and odour.

b) Physicochemical Properties

The physicochemical evaluation of the prepared KaidaryaAsava included the determination of total solids, total residue, specific gravity, pH, and alcohol content.

IV. RESULT

Table No.4 – Analytical Parameter

Test	Result	Standard
Description	Clear liquid	Colour – Brown Odour – Characteristic Taste - Bitter
Total Solid	12.0%	30.0%
Total Residue	0.2%	1.2%
Specific Gravity	1.04	1.2
pH Direct	3.3	7.0
Alcohol Content	4.40%	9.5%

V. DISCUSSION

The review highlights that Asava–Arishta preparations hold a distinct position in Ayurvedic pharmaceutics due to their unique method of self-generated alcoholic fermentation. This endogenous alcohol, produced through microbial transformation, plays a crucial role in enhancing the extraction of phytoconstituents and improving their bioavailability. Hydro-alcoholic extraction facilitates deeper penetration of active compounds, enabling efficient delivery to target tissues. This explains the rapid therapeutic onset and increased potency observed in many fermented formulations.

Biotransformation mediated by indigenous microbes further enriches the medicinal value of these preparations. Microbial enzymes break down complex plant compounds into more assimilable molecules, improving pharmacological activity while naturally preserving the formulation. In modern manufacturing, however, standardisation becomes essential to ensure batch-to-batch consistency, potency, and safety, given the variability in phytochemical content influenced by season, geography, and processing methods.

Natural, plant-based formulations continue to gain global acceptance due to their affordability, biocompatibility, and minimal side effects. Murrayakoenigii (curry leaves) is one such highly revered medicinal plant used traditionally for a wide range of therapeutic purposes. Its bioactive compounds—including carbazole alkaloids, flavonoids, and essential oils—have demonstrated antioxidant, antimicrobial, hepatoprotective, antidiabetic, and hair-nourishing properties. Traditionally,it can be recommended as an internal remedy for strengthening hair, preventing premature greying, and reducing hair thinning, curry leaves are widely consumed but have not been systematically translated into classical fermented dosage forms.

In this context, KaidaryaAsava represents a novel and scientifically significant advancement. Although curry leaves are well-known for internal consumption for hair and scalp health, no established classical Asava preparation using Murrayakoenigii exists in the traditional Ayurvedic compendia. The preparation of KaidaryaAsava thus integrates classical principles of Sandhana Kalpana with a widely accessible, nutritionally valuable, and pharmacologically rich herb. The formulation offers potential benefits such as:

- Improved extraction of lipophilic and hydrophilic compounds through a hydro-alcoholic medium.
- Enhanced bioavailability of hair-beneficial alkaloids and antioxidants.
- Longer shelf life and natural preservation via self-generated alcohol.
- Synergistic enhancement from PrakshepaDravyas (e.g., Dalchini, Ela, Pippali).
- Broader therapeutic activity including anti-dandruff, scalp infection control, hair conditioning, and hair strengthening.

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Given the increasing demand for natural solutions to hair and scalp disorders, KaidaryaAsava represents an innovative approach that aligns traditional Ayurvedic wisdom with contemporary consumer needs.Kwatha, though classical, is often inconvenient due to its need for fresh preparation and large, less palatable doses. Churna also poses compliance challenges, as it requires an Anupana and is not always acceptable in taste. Asava Kalpana overcomes these limitations by providing a stable, ready-to-use liquid formulation with a smaller dose and better acceptability across age groups. These advantages make preparations like KaidaryaAsava more practical for patients and highly suitable for standardized, large-scale production.

VI. CONCULSION

From this review, it may be concluded that Ayurvedic fermented formulations such as Asava and Arishta offer significant advantages in terms of extraction efficiency, bioavailability, stability, and therapeutic efficacy. The self-generated alcohol formed through microbial fermentation serves as a natural solvent and preservative, while biotransformation enhances the potency of the medicinal constituents. Standardisation using modern analytical tools remains essential to ensure safety, efficacy, and consistency in present-day manufacturing.

Murrayakoenigii is a pharmacologically potent and culturally familiar medicinal plant with longstanding use in traditional healthcare. Despite its wide recognition as a natural remedy for hair strengthening, premature greying, and scalp health, no classical fermented formulation utilising curry leaves exists. KaidaryaAsava, therefore, represents a unique and innovative preparation that fills this gap.

The introduction of such a formulation is highly relevant in today's context, where consumers seek natural, effective, and scientifically validated alternatives for hair and scalp care. By combining the therapeutic richness of curry leaves with the advantages of Sandhana Kalpana, KaidaryaAsava has the potential to become a valuable addition to Ayurvedic pharmaceutics. Further research—such as phytochemical profiling, standardisation, safety evaluation, and clinical trials—is warranted to substantiate its efficacy and promote its wider application in both clinical and commercial sectors.

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