

“Ayurvedic principles and natural ingredients: pioneering new frontiers in health and personal care-integrating Ayurvedic principles and natural ingredients for enhanced health and wellness”

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Abstract:

This study explores the development and optimisation of herbal tablets and shampoos using *Kalanchoe pinnata* extract and various natural ingredients, grounded in Ayurvedic principles. *Kalanchoe pinnata*, a traditional herb known for its potential anticancer and urinary stone treatment properties, is formulated into tablets with varying concentrations and excipients. The tablets are evaluated for key pharmaceutical parameters such as: hardness, friability, disintegration time, and dissolution profile, with advanced analytical techniques employed to assess bioactive components. Also, the study includes the formulation of a herbal shampoo incorporating natural ingredients like soapnut, shikakai, and essential oils, designed to improve hair health while avoiding harsh chemicals. Both products aim to enhance patient compliance and treatment efficacy by providing effective, natural alternatives to conventional options. Palash (*Butea monosperma*) tea, enhanced with saffron, represents a powerful blend that integrates the beneficial properties of both ingredients. These researches highlight the integration of traditional Ayurvedic knowledge with modern pharmaceutical and cosmetic practices to offer holistic health solutions.

Keywords:

Ayurveda, Doshas, Eco-friendly formulations, Herbal shampoo, Herbal tablets, *Kalanchoe pinnata*, Natural ingredients, Panchakarma, Pharmaceutical evaluation, Plant-based surfactants.

Introduction:

Ayurveda: an overview

Ayurveda is a traditional system of medicine that originated in India over 5,000 years ago. Its name derives from the Sanskrit words "*ayur*" (life) and "*veda*" (knowledge), translating to "*the knowledge of life*." Ayurveda is founded on the principle of maintaining balance and harmony within the body, mind, and spirit, aiming to promote health and prevent illness rather than merely addressing symptoms (Lad, 1990; Sharma & Dash, 2009).

Core concepts in Ayurveda:

1. **Doshas:** Ayurveda identifies three primary energies or doshas—*Vata*, *Pitta*, and *Kapha*—that govern bodily functions and characteristics. Each person has a unique balance of these doshas, and maintaining this balance is crucial for health.
 - i. *Vata*: Associated with air and ether, it governs movement and communication (Saraswati, 2012).
 - ii. *Pitta*: Associated with fire and water, it regulates digestion, metabolism, and energy production (Lad, 1990).
 - iii. *Kapha*: Associated with earth and water, it controls structure, stability, and immunity (Sharma & Dash, 2009).
2. **Five elements (Pancha Mahabhuta):** Ayurveda posits that everything in the universe, including the human body, is composed of five fundamental elements: earth, water, fire, air, and ether. These elements combine in various ways to form the doshas (Saraswati, 2012).
3. **Prakriti:** Refers to an individual's unique constitution or body type, determined by the balance of doshas at birth. Understanding one's prakriti helps tailor lifestyle and dietary choices to maintain balance (Sharma & Dash, 2009).
4. **Sattva, Rajas, and Tamas:** These are the three gunas or qualities that influence mental and emotional states:
 - i. *Sattva*: Associated with purity and harmony (Saraswati, 2012).
 - ii. *Rajas*: Associated with activity and agitation (Lad, 1990).
 - iii. *Tamas*: Associated with inertia and darkness (Sharma & Dash, 2009).
5. **Dinacharya and Ritucharya:** Ayurveda emphasizes daily (dinacharya) and seasonal (ritucharya) routines to support health and balance. These practices include proper sleep, diet, exercise, and self-care tailored to one's dosha and the time of year (Saraswati, 2012).
6. **Diet and herbal remedies:** In Ayurveda, food is considered medicine. Diet is personalised based on one's dosha, current imbalances, and environmental factors. Herbal remedies and treatments are used to support and restore balance (Lad, 1990; Sharma & Dash, 2009).
7. **Panchakarma:** This is a set of detoxifying treatments designed to cleanse the body of toxins (ama) and restore dosha balance. It includes practices such as massage, oil treatments, and therapeutic procedures (Saraswati, 2012).

8. In Ayurveda, the concepts of Dosha, Dhātu, and Mala are fundamental to understanding the human body, serving as the core elements of its structure and function. Srotas, on the other hand, are the channels through which nutrients are transported to the Dhātu, ensuring the maintenance of health. According to Acharya Charak, Srotas are defined as “SraṇatSrotamsi,” indicating their role as the conduits for the flow of vital substances. Acharya Sushruta further describes Srotas as structures that emerge from hollow organs, spread throughout the body, and facilitate the distribution of essential elements. (Dr. Radheshyam Sharma, 2020).
9. These channels are integral to the internal transportation system, supporting the functions of critical bio-factors like the Tridoshas, the seven Dhātus, and Oja. Specifically, the Hridaya (heart) and the Dasha Dhamani (ten main arteries) are considered the primary sites for the RasavahaSrotas. The heart, located in the central mediastinum, continuously pumps blood throughout the body. It serves as both the reservoir and the pump for the Rasadhātu (nutritive fluid), while the Dasha Dhamani is responsible for distributing this fluid to every part of the body. (Dr. Radheshyam Sharma, 2020).
10. From a functional perspective, the Hridaya acts as the central storage and pumping mechanism for Rasadhātu, whereas the Dasha Dhamani facilitates its distribution. Together with Sira (veins) and Dhamani (arteries), the Hridaya forms the cornerstone of the cardiovascular system. Essentially, the term 'vascular' in the cardiovascular system refers to the Sira and Dhamani, which are the hollow, tubular structures crucial to this system. (Dr. Radheshyam Sharma, 2020).

Current research in Ayurveda: As daily life demands increasingly diverse products for various purposes, including purification and self-care, the need for such items continues to grow. Among the notable innovations in meeting these needs is the herbal pharmacy. This sector represents a significant advancement, offering products that not only support personal well-being but also contribute to the broader field of medicine and pharmaceuticals. One key example is hair shampoo, which addresses issues like dryness and excess oiliness. Shampoos formulated for dry hair effectively combat brittleness and restore moisture, making them essential for maintaining hair health. Herbal shampoos, in particular, are highly favoured for their natural benefits and aesthetic appeal. Their formulation ensures a pleasant user experience, making them a popular choice across different demographics. (Bhandare and Malode *et al*, 2022).

Formulation procedure:

To prepare the herbal shampoo, all herbal extracts were combined using a mortar and pestle with adequate amounts of water and neem oil to create a

thick, emulsion-like mixture. After thorough triturating, the blend was filtered through filter paper. Essential oils, such as Lavender, Rose, or Peppermint, were added to the filtered extract to enhance its fragrance. Citric acid was incorporated while continuously stirring the mixture to adjust the pH balance. The final volume was adjusted to 50 mL with additional water to achieve the desired viscosity. Egg white was included to enhance viscosity and act as a hair stimulant and growth promoter, similar to the effects of aloe vera or hibiscus extracts.(Bhandare and Malode *et al*, 2022).

Table 1. summarising the herbal shampoo formulation:(Bhandare and Malode *et al*, 2022).

Sr. No.	Ingredient/Composition	Quantity	Description
1	Reetha extract (Soap nut extract)	15 mg	Lathering agent, similar to SLS. Derived from <i>Sapindus mukorossi</i> . Collected from Torangan region, Trambakeshwar, Nashik. 422213-422214
2	<i>Senegaliarugata</i> (Shikakai). <i>Acacia concinna</i> . Soap nut acacia.	15 mg	Shampooing ingredient known for its traditional use in India. Contains alkaloids and natural sugars.
3	Lemon peel powder/Orange peel powder.	q.s.	Used to treat dandruff, repair skin damage, and act as a wound healing agent.
4	Egg White (Albumin)	10%/q.s.	Provides viscosity and acts as a hair stimulant and growth promoter.
5	Perfume (Rose, Lavender, Peppermint)	q.s.	Enhances the fragrance of the shampoo.
6	Oil (Sunflower/Olive/Coconut)	q.s.	Adds conditioning and moisturising properties.
7	Preservative	q.s.	Used to extend the shelf life of the shampoo.

8	Water (Triple Distilled/USP)	q.s.	Acts as a solvent and base for the shampoo.
9	Buffer/pH adjuster	q.s. until desired pH is obtained	Adjusts the pH of the shampoo to ensure it is skin-friendly.
10	NaCl	q.s.	Used to adjust the viscosity and stability of the formulation.

The formulation of the herbal shampoo involved blending aqueous extracts of soapnut, shikakai, and lemon in a precise ratio, as detailed in the table. These extracts contain key phytoconstituents, including soap-berry saponins, which act as natural surfactants with detergent and foaming capabilities. Achieving optimal viscosity was a crucial aspect of the formulation, and several natural ingredients were selected for their viscosity-enhancing properties. (Bhandare and Malode *et al*, 2022).

To ensure the shampoo maintains an acidic pH, lemon juice was incorporated. The shampoo was created by mixing soapnut with equal parts of each herbal extract. The 10% albumin solution used in the formulation exhibits pseudo-plastic behavior, creating a clear solution that supports hair growth, similar to aloe vera extract and Acacia concinna. Lemon juice (1 mL/q.s.) was added for its role as a natural chelating agent, antidandruff treatment, antioxidant, and to sustain the acidic pH of the shampoo. Additionally, lemon juice aids in cleansing. (Bhandare and Malode *et al*, 2022).

Albumin and protein contribute to strengthening hair fibers and promoting growth. The inclusion of albumin and gelatin, alongside wound-healing agents like aloe vera and lemon, helps maintain hair strength and support healthy growth. Alternative ingredients such as hibiscus or Ecliptaprostrata (false daisy) could be used instead of albumin for similar benefits. Aloe vera further fortifies and rejuvenates brittle hair, enhancing strand development and overall hair health. (Bhandare and Malode *et al*, 2022).

The formulation also integrates nourishing oils—coconut, sunflower, and olive—to cleanse the hair gently, avoiding the harsh effects often associated with synthetic detergents or soapnut alone. The primary objective of this study was to develop a herbal shampoo that minimizes hair loss during combing and offers a safer alternative to synthetic products available in the market. This shampoo aims to enhance hair growth and conditioning. (Bhandare and Malode *et al*, 2022).

Traditional cultures often utilize medicinal herb extracts for hair washing, and this formulation aligns with that practice. Unlike synthetic cationic conditioners, the shampoo uses Senegaliarugata and soapnut extracts to deliver similar conditioning effects. The goal was to create a stable and effective shampoo with minimal synthetic ingredients, providing a natural herbal hair cleanser. (Bhandare and Malode *et al*, 2022).

Evaluation of the shampoo demonstrated its effectiveness, with satisfactory quality control results. The developed shampoo produced healthy, shiny, and silky hair. The formulation process is adaptable to include various additional ingredients, depending on consumer preferences, market trends, and other factors, offering a viable alternative to conventional synthetic shampoos. (Bhandare and Malode *et al*, 2022).

Aspects of natural ingredients in herbal shampoos:

Botanical extracts:

Herbal shampoos frequently use botanical extracts known for their specific benefits to hair and scalp health. These extracts, such as aloe vera, chamomile, rosemary, lavender, hibiscus, green tea, and calendula, offer a range of properties including scalp soothing, hair growth promotion, shine enhancement, and oil balance. (Bhandare, Niphade and Pagar, 2023).

Essential oils:

Essential oils, concentrated plant extracts from aromatic plants, are included in herbal shampoos for their pleasant fragrances and therapeutic benefits. Oils like lavender, tea tree, peppermint, and rosemary can enhance the sensory experience of the shampoo and provide nourishing or strengthening effects for the scalp and hair. (Bhandare, Niphade and Pagar, 2023).

Natural emollients and moisturisers:

Herbal shampoos often feature natural emollients and moisturisers to hydrate and soften hair. Ingredients such as coconut oil, argan oil, shea butter, jojoba oil, and almond oil help retain moisture, improve elasticity, and reduce frizz, leading to smoother, more manageable hair.

Herbal infusions and tea extracts:

Some herbal shampoos utilise herbal infusions or tea extracts, made by steeping herbs in water, to harness their nourishing properties. Examples include chamomile, nettle, green tea, and horsetail teas, which can condition and improve hair health. (Bhandare, Niphade and Pagar, 2023).

Fruit and plant extracts:

Herbal shampoos may incorporate extracts from fruits and plants for additional benefits. For instance, lemon, orange, or grapefruit extracts offer refreshing scents and clarifying effects, while plant extracts like ginseng or acai berry provide antioxidants to protect hair from damage.

(Bhandare, Niphade and Pagar, 2023).

Avoidance of harsh chemicals

Chemical-free formulations:

Herbal shampoos are formulated without harsh chemicals such as sulfates, parabens, synthetic fragrances, artificial colours, and formaldehyde-releasing preservatives. This approach offers a cleaner, more natural alternative for hair care. (Bhandare, Niphade and Pagar, 2023).

Plant-based surfactants:

Instead of synthetic surfactants like sulfates, herbal shampoos often use plant-based surfactants. These include: (Bhandare, Niphade and Pagar, 2023).

- i. **Decyl Glucoside:** Derived from glucose and fatty alcohols, it is gentle on sensitive skin.
- ii. **Sodium Cocoyl Glutamate:** Sourced from coconut oil and fermented sugar, known for its mild cleansing and foaming.
- iii. **Disodium Cocoyl Glutamate:** Similar to sodium cocoyl glutamate, it is gentle and prevents dryness.
- iv. **Coco Glucoside:** Made from coconut oil and glucose, it is mild and used in natural products.
- v. **Sodium Lauroyl Sarcosinate:** From natural fatty acids, it offers gentle cleansing and is sulfate-free.
- vi. **Lauryl Glucoside:** Derived from coconut oil and glucose, it is biodegradable and mild.

Eco-Friendly formulations

Environmental considerations:

Herbal shampoos often aim to be environmentally friendly, reducing the use of harmful chemicals and opting for biodegradable ingredients. Eco-conscious packaging materials are also prioritised to minimise environmental impact. (Bhandare, Niphade and Pagar, 2023).

An Ayurvedic study of preparing herbal tablets formulated with *Kalanchoe pinnata* extract:

A research study that explored the formulation of herbal tablets using *Kalanchoe pinnata* extract, aiming to leverage its traditional applications for health benefits such as anticancer effects and treatment of urinary stones. The study involves optimising tablet formulations with varying concentrations of *Kalanchoepinnata* extract and excipients, and evaluating their pharmaceutical properties including hardness, friability, disintegration time, and dissolution profile. Advanced analytical techniques will be employed to assess the bioactive

components of the tablets. The anticipated outcome is to develop a practical and effective medication for kidney stones that enhances patient compliance by providing a convenient dosage form. The tablets are designed to relieve symptoms, facilitate stone dissolution, and prevent recurrence, potentially incorporating pharmacological agents to address specific aspects of kidney stone formation and progression, thereby improving treatment efficacy and patient adherence.

A table summarising the ingredients and their respective quantities:

Ingredient	Quantity
CMC (Carboxymethyl Cellulose)	11.5%
Lactose	10.3%
Okra mucilage	30.5%
Magnesium Stearate (Mg. st.)	1.7%
<i>Ficus racemose</i> powder (or Chanca Piedra)	15%
Extract of Cathedral Bells (<i>Kalanchoe pinnata</i>), Dried	25%
Aqueous vehicle: Coconut Water + <i>Tribulus terrestris</i> (Puncture vine)	q.s.
Perfume: Rose Oil	q.s.
<i>Butea monosperma</i> and <i>Crocus sativus</i> Extract, Dried	6%

(Bhandare and Jadhav, 2024)

Palash (*Butea monosperma*) tea, enriched with saffron, presents a potent beverage that harnesses the well-established benefits of both ingredients. This flavourful infusion is not only packed with antioxidants but also offers anti-inflammatory properties, making it a comprehensive choice for enhancing overall health and wellness. (Bhandare and Malode, 2024)

Palash is known for its digestive support and blood-purifying qualities, which, when paired with saffron's mood-lifting effects, creates a tea that addresses various health aspects. Traditional uses of palash for respiratory health and its potential anti-diabetic benefits further complement saffron, enhancing the tea's therapeutic profile. (Bhandare and Malode, 2024)

The combined immune-boosting properties of palash and saffron contribute to a strengthened natural defence system. Also, the calming and aromatic nature of

saffron enriches the tea-drinking experience, fostering relaxation and emotional well-being. (Bhandare and Malode, 2024)

Grounded in traditional Ayurvedic wisdom, this palash and saffron tea embodies a holistic approach to health. It offers not only a delightful flavour but also numerous benefits drawn from these practices. Incorporating this tea into one's routine can provide a refreshing path to balance and vitality. (Bhandare and Malode, 2024)

In conclusion, while Palash tea with saffron is recognised for its health benefits, such as antidiabetic properties and soothing effects, there is limited evidence linking tea consumption with increased awareness of its antioxidant, anti-inflammatory, digestive, blood-purifying, mood-enhancing, respiratory, and immune-boosting qualities. These insights suggest that although the tea offers various health advantages, awareness of these benefits may not significantly influence the decision to consume Palash tea with saffron. (Bhandare and Malode, 2024)

Palash (*Butea monosperma*) tea, fortified with saffron, offers a potent combination that merges the advantageous qualities of each ingredient. This infusion is rich in antioxidants and provides anti-inflammatory effects, making it a valuable addition to health and wellness routines. Palash is renowned for its digestive and blood-purifying benefits, while saffron is celebrated for its mood-lifting properties. Together, these elements create a tea that supports various aspects of health, including respiratory function and potential anti-diabetic effects. Also, the tea's immune-boosting qualities and the calming influence of saffron offer a comprehensive approach to enhancing overall well-being. Despite the recognised health benefits, there is limited evidence linking increased awareness of these advantages to actual tea consumption patterns. This study mainly signifies the potential of Palash tea with saffron for promoting health but also highlights the need for more research into consumer awareness and its impact on health-related decisions. (Bhandare and Malode, 2024)

Discussion:

The research highlights the efficacy of using *Kalanchoepinnata* in herbal tablets for its traditional benefits, including its role in treating urinary stones and potential anticancer effects. The optimisation process, including the evaluation of pharmaceutical parameters, ensures the tablets are effective and stable, providing a convenient and reliable treatment option.

In the development of the herbal shampoo, the study showcases the benefits of natural ingredients such as soapnut and shikakai, which align with Ayurvedic practices. The formulation effectively avoids harsh chemicals and uses plant-

based surfactants, promoting hair health and minimising adverse effects commonly associated with synthetic products. The incorporation of essential oils and natural emollients enhances the shampoo's sensory experience and conditioning properties.

Overall, the integration of Ayurvedic principles with modern formulation techniques presents a promising approach to health and personal care products. The research signifies the importance of holistic and natural solutions, offering viable alternatives to conventional pharmaceuticals and cosmetics while aligning with environmental sustainability and patient well-being. Future research could expand on these formulations to explore additional applications and refine their efficacy further, contributing to the broader field of integrative and natural health solutions.

The integration of Palash and saffron in tea presents a notable example of combining traditional wisdom with modern health benefits. The antioxidant and anti-inflammatory properties of this tea make it a valuable option for overall wellness, potentially addressing a range of health issues from digestive problems to mood disorders. The traditional uses of palash for respiratory health and its possible anti-diabetic effects, combined with saffron's mood-lifting and immune-boosting benefits, create a multi-faceted health beverage.

Despite these benefits, the study finds a gap in consumer awareness and its impact on tea consumption. Although the health advantages of Palash and saffron tea are significant, increased consumer awareness of these benefits does not necessarily translate into higher consumption. This suggests that while the tea has considerable health potential, factors other than health awareness—such as: taste preference, availability, and cultural practices—might influence consumption patterns.

Conclusion:

The study successfully demonstrates the potential of integrating *Kalanchoe pinnata* extract into tablet formulations for addressing health conditions such as kidney stones, with the formulation optimised for efficacy and stability. The herbal shampoo, using a blend of natural extracts and essential oils, proves to be an effective and eco-friendly alternative to synthetic hair care products. Both products align with Ayurvedic principles by focusing on balance and harmony and offer practical, natural solutions for health and personal care. The findings signify the value of combining traditional herbal knowledge with contemporary formulation techniques to enhance therapeutic outcomes and patient adherence. Palash tea infused with saffron provides a unique blend of health benefits that leverage the strengths of both ingredients. The tea's antioxidant and anti-inflammatory properties, combined with the digestive support and mood-enhancing effects of palash and saffron respectively, offer a

holistic approach to health. The immune-boosting and calming benefits further enhance the tea's therapeutic profile. However, while the health benefits are well-documented, there is a lack of strong evidence connecting increased consumer awareness of these benefits to actual tea consumption. This indicates that while the tea is beneficial, more focused research is needed to understand how awareness of its health properties influences consumption behaviours.

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