
FORMULATION AND EVALUATION OF HERBAL SHAMPOO

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ABSTRACT

Herbal cosmetics have gained considerable attention in recent years due to increasing awareness regarding the harmful effects of synthetic ingredients and the growing preference for natural products. Herbal shampoo is one such cosmetic preparation developed using plant-derived materials that possess cleansing, conditioning, antimicrobial, anti-dandruff, and hair-strengthening properties. The present study focuses on the formulation and evaluation of an herbal shampoo prepared using various medicinal plant extracts known for promoting scalp health and maintaining hair hygiene. Herbal ingredients such as aloe vera, hibiscus, neem, shikakai, amla, reetha, and fenugreek were selected based on their traditional therapeutic value and beneficial effects on hair care.

The formulated shampoo was prepared using suitable natural surfactants and stabilizing agents to achieve acceptable physicochemical characteristics. The prepared formulation was evaluated for different parameters including physical appearance, pH, viscosity, foam ability, foam stability, surface tension, wetting time, dirt dispersion, percentage of solid content, cleansing action, and skin irritation potential. Stability studies were also conducted to assess the formulation's quality under different storage conditions. Therefore, herbal shampoo can be considered a safe, economical, and effective alternative to conventional synthetic shampoos, with reduced chances of adverse effects and improved consumer acceptability.

KEYWORDS: Herbal Shampoo, Polyherbal Formulation, Hair Care, Natural Cosmetics, Physicochemical Evaluation, Medicinal Plants, Anti-dandruff Activity.

I. INTRODUCTION

Herbal shampoo is a cosmetic preparation made from naturally derived ingredients, particularly medicinal plants and their extracts, used for cleansing the scalp and hair while maintaining hair health. Unlike conventional shampoos that often contain synthetic detergents, preservatives, and artificial fragrances, herbal shampoos primarily utilize plant-based substances known for their cleansing, conditioning, antimicrobial, and nourishing properties. The increasing awareness regarding the side effects of synthetic cosmetic products has significantly contributed to the popularity of herbal shampoos among consumers seeking safer and eco-friendly alternatives. The concept of herbal hair care has existed for centuries in traditional systems of medicine such as Ayurveda, where herbs like shikakai, amla, neem, bhringraj, hibiscus, and reetha have been widely used for maintaining healthy hair and scalp. Herbal shampoos are generally formulated using natural or mild surfactants combined with herbal extracts and excipients that improve consistency, stability, and preservation. Saponin-containing herbs such as reetha (soapnut) and shikakai are frequently included because of their natural foaming and cleansing abilities. Amla is commonly used for strengthening hair follicles and enhancing hair growth, while neem exhibits antimicrobial and anti-dandruff properties. Aloe vera helps soothe the scalp and provides moisturizing effects, whereas hibiscus contributes to hair smoothness and conditioning. The preparation of herbal shampoo involves the extraction of active constituents from selected herbs, followed by incorporation into a shampoo base containing surfactants, thickening agents, preservatives, perfumes, and conditioning agents. The finished product is evaluated for several physicochemical parameters such as color, odor, consistency, pH, viscosity, foam stability, wetting time, dirt dispersion, cleansing efficiency, percentage of solid content, and skin irritation potential to ensure quality, safety, and effectiveness.

II. DRUG PROFILE

1. Shikakai

- **Biological Source:** Dried pods and bark of *Acacia concinna*.
- **Family:** Fabaceae
- **Chemical Constituents:** Saponins, tannins, flavonoids, alkaloids.
- **Uses:** Natural cleanser, removes dirt and excess oil, improves hair softness.
- **Properties:** Mild cleansing, antimicrobial, conditioning effect.

2. Amla

- **Biological Source:** Fruits of *Phyllanthus emblica* (*Emblica officinalis*).

- **Family:** Phyllanthaceae
- **Chemical Constituents:** Vitamin C, tannins, flavonoids, polyphenols.
- **Uses:** Strengthens hair, promotes growth, adds shine.
- **Properties:** Antioxidant, antimicrobial, nourishing action.

3. Aloe vera

- **Biological Source:** Gel from leaves of *Aloe barbadensis* Miller.
- **Family:** Asphodelaceae
- **Chemical Constituents:** Polysaccharides, vitamins, enzymes, amino acids.
- **Uses:** Moisturizes scalp, reduces dryness, conditions hair.
- **Properties:** Anti-inflammatory, soothing, antimicrobial.

4. Bhringraj

- **Biological Source:** Whole plant of *Eclipta alba* (*Eclipta prostrata*).
- **Family:** Asteraceae
- **Chemical Constituents:** Wedelolactone, flavonoids, alkaloids, triterpenes.
- **Uses:** Reduces hair fall, nourishes roots, supports hair growth.
- **Properties:** Antioxidant, antimicrobial, hair-strengthening activity.

III. EXPERIMENTAL

Preformulation Study

Preformulation studies are an essential step in the development of a safe, stable, and effective formulation. These studies are carried out to evaluate the physical and chemical characteristics of ingredients used in the preparation and to understand their behavior during formulation. In herbal shampoo development, preformulation helps assess the compatibility of herbal extracts with other formulation ingredients, ensuring product stability, safety, and performance. It also aids in selecting suitable excipients and optimizing the formulation for better quality and effectiveness.

Goals of Preformulation Study

- To identify and evaluate important physicochemical properties of the active ingredients and herbal components used in the formulation.
- To determine the compatibility between herbal ingredients and excipients in order to avoid instability or undesirable interactions.
- To support the development of a formulation with acceptable quality, stability, and therapeutic effectiveness.
- To assist in selecting suitable ingredients and processing methods for the final product.



IV. REVIEW OF LITERATURE

2017

- **Cause/Topic:** Hair care cosmetics from traditional shampoo to herbal shampoo
- **By Whom:** Michela Chiari Andena and collaborators
- **Pharmaceutical Importance:** Reviewed the transition from synthetic shampoos to herbal and clay-based formulations.
- **Conclusion:** Herbal shampoos are safer alternatives with growing cosmetic and pharmaceutical relevance.
- **Number of Contributors:** Multiple contributors
- **Summary:** This review described the evolution of shampoo formulations and highlighted growing consumer demand for natural ingredients. Researchers reported that herbal shampoos containing plant extracts offer cleansing, conditioning, and scalp-soothing benefits while reducing reliance on harsh surfactants such as sodium lauryl sulfate (SLS). The study also discussed formulation challenges including stability and standardization.

2018

- **Cause/Topic:** Evaluation parameters of herbal shampoos
- **By Whom:** Cosmetic and pharmaceutical scientists
- **Pharmaceutical Importance:** Investigated quality control tests for herbal shampoo formulations.

➤ **Conclusion:** Proper physicochemical evaluation ensures quality, stability, and consumer acceptability.

➤ **Number of Contributors:** Multiple authors

➤ **Summary:** Researchers emphasized that herbal shampoos should undergo rigorous evaluation for pH, viscosity, foam stability, dirt dispersion, surface tension, and wetting time. Such testing ensures formulation consistency and safety while maintaining cleansing effectiveness and scalp compatibility.

2020

➤ **Cause/Topic:** Herbal ingredients for anti-dandruff and hair growth promotion

➤ **By Whom:** Pharmaceutical and herbal researchers

➤ **Pharmaceutical Importance:** Studied medicinal herbs like neem, hibiscus, bhringraj, and aloe vera in hair-care products.

➤ **Conclusion:** Herbal extracts demonstrated antimicrobial, nourishing, and scalp-protective activities.

➤ **Number of Contributors:** Multiple contributors

➤ **Summary:** Studies showed that herbal ingredients used in shampoos may reduce dandruff, improve hair growth, and enhance scalp health.

2022

➤ **Cause/Topic:** Herbal and chemical shampoo formulation, assessment, and comparison

➤ **By Whom:** Dr. Sanjeev Kumar, Poonam Bhardwaj, Ritu Verma, Netrapal, Saloni Manglik, Deepika Chauhan, Renu Tiwari, Mohd Irshad, and Km. Shiva

➤ **Pharmaceutical Importance:** Compared herbal shampoo formulations with synthetic shampoos.

➤ **Conclusion:** Herbal shampoos demonstrated effective cleansing with fewer risks of scalp irritation.

➤ **Number of Contributors:** 9 authors

➤ **Summary:** This study formulated herbal shampoo using hibiscus, neem, amla, aloe vera, reetha, and shikakai extracts and compared it with chemical shampoo formulations. The herbal formulation showed acceptable rheology, foam stability, pH, detergency, and skin compatibility. Researchers concluded that herbal shampoos can provide effective cleansing while avoiding harsh chemical effects on the scalp.

2024

➤ **Cause/Topic:** Review: Analysis and formulation of herbal shampoo

➤ **By Whom:** Shweta Badure

➤ **Pharmaceutical Importance:** Reviewed formulation techniques, herbal ingredients, and evaluation methods for herbal shampoos.

➤ **Conclusion:** Herbal shampoos are effective, safer alternatives but require standardization for consistent quality.

➤ **Number of Contributors: 1 author**

➤ **Summary:** The review discussed common herbal ingredients such as reetha, shikakai, neem, aloe vera, hibiscus, and amla used in herbal shampoos. It emphasized their therapeutic benefits in reducing dandruff, nourishing hair, and protecting scalp health. The author also highlighted the importance of physicochemical testing and formulation optimization for commercial success.

2025

➤ **Cause/Topic:** Review and formulation of herbal shampoo

➤ **By Whom:** Vaibhav Waghole, Vishakha Divekar, and Nitin Gawai

➤ **Pharmaceutical Importance:** Examined formulation strategies and safety profiles of herbal shampoos.

➤ **Conclusion:** Herbal shampoos offer safer and more sustainable alternatives to synthetic shampoos.

➤ **Number of Contributors: 3 authors**

➤ **Summary:** This review described the growing consumer preference for herbal shampoos due to concerns regarding harsh synthetic detergents and preservatives. Researchers reported that ingredients such as reetha, shikakai, aloe vera, neem, and amla provide cleansing, conditioning, antimicrobial, and hair-strengthening effects.

V. MATERIAL AND METHOD

1. Formulation Table of Herbal Shampoo

S. No.	Ingredients	Quantity (%) w/v)	Role in Formulation
1	Reetha extract (<i>Sapindus mukorossi</i>)	15	Natural cleansing agent
2	Shikakai extract (<i>Acacia concinna</i>)	10	Natural surfactant and conditioner
3	Amla extract (<i>Phyllanthus emblica</i>)	8	Hair strengthening and nourishment
4	Hibiscus extract (<i>Hibiscus rosa-sinensis</i>)	5	Hair growth promoter and conditioner
5	Aloe vera gel	5	Moisturizing and soothing agent
6	Neem extract (<i>Azadirachta</i>)	3	Anti-dandruff and

	<i>indica</i>)		antimicrobial agent
7	Glycerin	3	Humectant
8	Citric acid	q.s.	pH adjustment
9	Methyl paraben	0.2	Preservative
10	Rose oil / Lavender oil	0.5	Fragrance
11	Distilled water	q.s. to 100 mL	Vehicle

2. Method of Preparation of Herbal Shampoo

- 1. Collection and Preparation of Herbal Extracts:** Reetha, shikakai, amla, hibiscus, and neem were collected, cleaned thoroughly, dried under shade, and powdered separately. The powdered materials were extracted using distilled water by decoction method and filtered.
- 2. Preparation of Base:** A measured quantity of distilled water was taken in a clean beaker. Aloe vera gel and glycerin were added gradually with continuous stirring to obtain a homogeneous mixture.
- 3. Addition of Herbal Extracts:** Prepared herbal extracts of reetha, shikakai, amla, hibiscus, and neem were added slowly into the base solution under continuous stirring to ensure uniform mixing.
- 4. Addition of Additives:** Methyl paraben was dissolved separately and incorporated as a preservative. Fragrance oil was added to improve odor and acceptability.
- 5. pH Adjustment:** Citric acid solution was added dropwise to adjust the pH of the shampoo between 5.5–6.5, suitable for scalp application.
- 6. Final Volume Adjustment:** Distilled water was added to make the final volume up to 100 mL and mixed thoroughly.
- 7. Packaging:** The prepared herbal shampoo was transferred into clean, airtight containers and stored at room temperature for further evaluation.

I. EVALUATION OF HERBAL HAIR GEL FORMULATIONS

S. No.	Evaluation Parameter	Result
1	Color	Dark brown
2	Odor	Pleasant herbal aroma
3	Appearance	Smooth and homogeneous
4	pH	5.8 ± 0.2
5	Foam ability	145 mL
6	Foam stability	Stable for 6 minutes
7	Dirt dispersion	Good cleansing property

8	Viscosity	1850 cps
9	Surface tension	34 dynes/cm
10	Wetting time	132 seconds
11	Solid content	27%
12	Skin irritation test	No irritation observed
13	Conditioning effect	Hair appeared soft and manageable

II. EVALUATION OF HERBAL HAIR GEL FORMULATIONS

➤ **Physical appearance/ Visual inspection:** The formulated herbal hair gel was evaluated for color, transparency, odor, visual appearance, and foreign particles [24]. In Table 3, the outcomes are summarised. Determination of pH The digital pH metre was used to calculate the pH of different hair gel compositions. In 100ml of distilled water, one gram of gel was dissolved and allowed to stand for two hours. The pH of the hair gel formulations was measured after fully submerging the electrodes.

➤ **Viscosity:** The Brookfield viscometer was used for the measurement of the viscosity of the prepared gel. The Brookfield viscometer was spun at 100 rpm, spindle no. 6. After the sample reached equilibrium at the end of the first two minutes, each reading was taken.

➤ **Extrudability:** Metal tubes with foldable ends were filled with the hair gel formulas. The material was forced through the tubes, and the formulations extrudability was evaluated. The formulations' ability to be extruded was examined. The formulations extrudability was assessed by calculating the weight in grams needed to extrude a 0.5 cm gel ribbon in 10 seconds.

Stability studies: The formulated gel was filled within the collapsible tubes and stored at room temperature and 40°C at 75% RH. The three-month stability assessment was carried out. The parameters like appearance, pH, homogeneity, viscosity, and spreadability were tested every month.

III. RESULTS AND DISCUSSION

The prepared herbal shampoo formulation was successfully developed using natural ingredients such as reetha, shikakai, amla, hibiscus, neem, and aloe vera. The formulation exhibited satisfactory physicochemical characteristics and was found suitable for hair cleansing and conditioning purposes. The shampoo appeared dark brown in color with a pleasant herbal odor and showed a smooth, homogeneous consistency, indicating proper mixing of ingredients without phase separation. The visual appearance and texture suggested good formulation stability and consumer acceptability. The pH of the formulation was found to be 5.8 ± 0.2 , which falls within the ideal range for scalp and hair care. A slightly acidic pH

helps maintain the natural protective barrier of the scalp and reduces hair damage, dryness, and irritation.

Foamability and foam stability are important characteristics of shampoos as they influence user perception of cleansing effectiveness. The formulated shampoo produced 145 mL of foam with good stability for about 6 minutes, demonstrating satisfactory foaming ability due to the presence of natural surfactants from reetha and shikakai. Although herbal shampoos generally produce less foam compared to synthetic shampoos, the obtained results were considered acceptable. The dirt dispersion test showed good cleansing efficiency, indicating that the shampoo effectively removed impurities from hair without excessive residue formation. The presence of reetha contributed significantly to cleansing action, while shikakai enhanced smoothness and detangling properties. The viscosity of the shampoo was recorded as 1850 cps, which indicated suitable consistency for easy application and handling. Proper viscosity ensures that the shampoo spreads evenly on hair and does not become excessively runny or thick.

The surface tension value of 34 dynes/cm suggested effective wetting and cleansing action. Lower surface tension enhances spreading and penetration of shampoo into hair strands, improving cleaning efficiency. The wetting time was found to be 132 seconds, indicating good wetting ability and proper interaction with hair surfaces. Additionally, the solid content of 27% reflected an acceptable concentration of active herbal components without making the formulation excessively dense.

No signs of redness, itching, or irritation were observed during the skin irritation test, indicating that the formulation was safe and suitable for topical application. Furthermore, the shampoo demonstrated a good conditioning effect, leaving hair soft, smooth, and manageable due to the combined action of aloe vera, hibiscus, and amla. Overall, the evaluation results indicated that the formulated herbal shampoo possessed desirable cleansing, conditioning, and safety properties, making it a suitable alternative to shampoos containing synthetic chemicals.

V. CONCLUSION

The present study successfully formulated and evaluated a herbal shampoo using natural ingredients including reetha, shikakai, amla, hibiscus, neem, and aloe vera. The developed formulation showed satisfactory physicochemical properties such as acceptable pH, foamability, viscosity, wetting ability, and cleansing action. The herbal shampoo demonstrated effective cleaning performance along with conditioning benefits, making hair

softer, smoother, and easier to manage. The absence of skin irritation confirmed its safety for regular use. The incorporation of herbal ingredients provided additional benefits such as nourishment, anti-dandruff activity, scalp protection, and hair strengthening. Based on the obtained evaluation results, it can be concluded that the formulated herbal shampoo is an effective, safe, and economical alternative to synthetic shampoos and may help minimize adverse effects associated with chemical-based hair care products. Further studies on long-term stability and large-scale formulation may enhance its commercial applicability.

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