



Research Article

Formulation and Evaluation of Herbal Shampoo

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Herbal shampoos are cosmetic preparations used for cleansing hair and scalp while maintaining hair health through natural ingredients. The increasing awareness regarding the side effects of synthetic chemicals has led to a growing demand for herbal-based hair care products. The present study aimed to formulate and evaluate a herbal shampoo using medicinal plant materials such as Neem (*Azadirachta indica*), Shikakai (*Acacia concinna*), Amla (*Phyllanthus emblica*), Aloe vera (*Aloe barbadensis*), Fenugreek (*Trigonella foenum-graecum*), Hibiscus (*Hibiscus rosa-sinensis*), Rosemary (*Rosmarinus officinalis*), and Jatamansi (*Nardostachys jatamansi*). The selected herbal ingredients were processed and incorporated in suitable proportions to prepare a herbal shampoo with cleansing, conditioning, anti-dandruff, and hair growth-promoting properties. The formulated shampoo was evaluated for various physicochemical parameters including physical appearance, pH, viscosity, foamability, foam stability, wetting time, dirt dispersion, solid content, surface tension, and stability studies. The results demonstrated that the formulated herbal shampoo possessed acceptable organoleptic characteristics, good foaming ability, satisfactory cleansing action, suitable pH for scalp application, and adequate stability under storage conditions. The presence of bioactive phytoconstituents from the herbal ingredients contributed to improved hair conditioning and scalp health. The formulation was found to be safe, effective, eco-friendly, and free from harsh synthetic chemicals.

Keywords: Herbal Shampoo, Neem (*Azadirachta indica*), Shikakai (*Acacia concinna*), Amla (*Phyllanthus emblica*), Aloe vera (*Aloe barbadensis*), Fenugreek (*Trigonella foenum-graecum*), Hibiscus (*Hibiscus rosa-sinensis*), Rosemary (*Rosmarinus officinalis*), and Jatamansi (*Nardostachys jatamansi*).

INTRODUCTION

Herbal shampoo is a hair-cleansing formulation prepared using natural herbs and plant-derived ingredients that possess cleansing, conditioning, nourishing, and therapeutic properties. It combines traditional herbal knowledge with modern cosmetic technology to provide effective hair care with minimal side effects. Common herbal ingredients used in herbal shampoos include Amla, Reetha, Shikakai, Neem, Aloe vera, Hibiscus, Bhringraj, and Fenugreek. These herbs help maintain scalp health, strengthen hair roots, reduce dandruff, and promote healthy hair growth.

Advantages of Herbal Shampoo

Herbal shampoos offer several advantages over synthetic shampoos:

- Prepared from natural and plant-based ingredients.
- Less irritating and safer for the scalp and hair.
- Promote healthy hair growth and nourishment.
- Help reduce dandruff and scalp infections.
- Minimize hair fall and hair damage.

- Environmentally friendly and biodegradable.
- Possess antioxidant and antimicrobial properties.
- Suitable for regular use with fewer side effects.
- Improve hair texture, shine, and manageability.

Need for Herbal Products

In recent years, there has been increasing concern regarding the adverse effects of synthetic chemicals present in cosmetic products. Prolonged use of chemical-based shampoos may cause scalp irritation, dryness, allergic reactions, and hair damage. Consumers are becoming more aware of the benefits of natural products and are seeking safer alternatives for personal care. Herbal products are gaining popularity due to their effectiveness, safety, affordability, and eco-friendly nature. The use of medicinal plants in hair care has been practiced for centuries and continues to be an important aspect of traditional healthcare systems. Therefore, the development of herbal shampoos has become essential to meet the growing demand for natural and sustainable cosmetic products.

Objectives of the Study

The main objectives of the present study are:

- To formulate a herbal shampoo using selected medicinal plant ingredients.
- To evaluate the physicochemical properties of the formulated herbal shampoo.
- To assess parameters such as appearance, pH, viscosity, foamability, wetting time, and stability.
- To determine the cleansing and conditioning properties of the formulation.
- To develop a safe, effective, and economical herbal shampoo.
- To provide a natural alternative to synthetic shampoos with minimal side effects.
- To study the potential benefits of herbal ingredients in maintaining healthy hair and scalp.

REVIEW OF LITERATURE

Neem (*Azadirachta indica*)

Neem is a well-known medicinal plant belonging to the family Meliaceae. It possesses antimicrobial, antifungal, anti-inflammatory, and antioxidant properties. Neem extracts are commonly used in hair care products due to their effectiveness against dandruff-causing microorganisms and scalp infections. The presence of bioactive compounds such as nimbin and azadirachtin helps maintain scalp hygiene and promotes healthy hair growth. Neem also reduces itching and irritation of the scalp.

Shikakai (*Acacia concinna*)

Shikakai is traditionally known as a natural hair cleanser and belongs to the family Fabaceae. It contains natural saponins that provide gentle cleansing without stripping the natural oils of the hair. Shikakai helps strengthen hair roots, prevents dandruff, reduces hair fall, and improves hair texture. It is widely used as a natural shampoo ingredient due to its mild cleansing and conditioning properties.

Amla (*Emblica officinalis*)

Amla, also known as Indian Gooseberry, belongs to the family Phyllanthaceae. It is rich in vitamin C, tannins, flavonoids, and antioxidants. Amla nourishes hair follicles, promotes hair growth, strengthens hair roots, and prevents premature greying. Its antioxidant activity protects hair from environmental damage and improves overall hair health.

Aloe Vera (*Aloe barbadensis* Miller)

Aloe vera belongs to the family Asphodelaceae and is widely recognized for its moisturizing and soothing properties. It contains vitamins, minerals, enzymes, amino acids, and polysaccharides that nourish the scalp and hair. Aloe vera helps reduce scalp dryness, dandruff, and irritation while improving hair softness and manageability. It also promotes healthy hair growth by maintaining scalp hydration.

Fenugreek (*Trigonella foenum-graecum*)

Fenugreek belongs to the family Fabaceae and is a rich source of proteins, nicotinic acid, lecithin, and

mucilage. It is extensively used in hair care formulations to strengthen hair roots and reduce hair fall. Fenugreek helps improve hair texture, provides natural conditioning, and prevents dandruff. The mucilage present in fenugreek contributes to smooth and shiny hair.

Hibiscus (*Hibiscus rosa-sinensis*)

Hibiscus belongs to the family Malvaceae and is traditionally used for promoting hair growth and preventing hair loss. The flowers and leaves contain flavonoids, amino acids, vitamins, and antioxidants that nourish hair follicles. Hibiscus acts as a natural conditioner, improves hair shine, and helps control dandruff and scalp irritation.

Rosemary (*Rosmarinus officinalis*)

Rosemary belongs to the family Lamiaceae and is widely used in herbal hair care products due to its antioxidant and antimicrobial properties. Rosemary extract improves blood circulation to the scalp, thereby enhancing nutrient supply to hair follicles. It helps stimulate hair growth, reduce hair thinning, and maintain scalp health. The essential oil of rosemary is also valued for its pleasant fragrance.

Jatamansi (*Nardostachys jatamansi*)

Jatamansi belongs to the family Caprifoliaceae and is an important medicinal herb in Ayurveda. It possesses

antioxidant, antimicrobial, and neuroprotective properties. In hair care formulations, Jatamansi is used to strengthen hair roots, promote hair growth, and reduce hair fall. It also helps maintain scalp health and imparts natural shine to the hair.

Reetha (*Sapindus mukorossi*)

Reetha, commonly known as soapnut, belongs to the family Sapindaceae. It contains a high concentration of natural saponins that act as excellent cleansing agents. Reetha effectively removes dirt, excess oil, and impurities from the scalp and hair. It produces natural foam and is frequently used as the primary cleansing ingredient in herbal shampoos. Additionally, it helps control dandruff and improves hair texture.

Flaxseed (*Linum usitatissimum*)

Flaxseed belongs to the family Linaceae and is rich in omega-3 fatty acids, proteins, vitamins, minerals, and mucilage. It provides excellent conditioning and moisturizing effects to hair. Flaxseed helps reduce hair breakage, improves elasticity, and adds shine to the hair. The mucilage content forms a protective layer on the hair shaft, improving smoothness and manageability.

MATERIALS AND METHODS

MATERIALS

S. No.	Ingredient	Quantity
1	Neem Powder	5 g
2	Shikakai Powder	3 g
3	Amla Powder	7 g
4	Aloe Vera Gel/Powder	5 g
5	Fenugreek Powder	3 g
6	Hibiscus Powder	5 g
7	Rosemary Powder	5 g
8	Jatamansi Powder	3 g
9	Reetha Powder	3 g
10	Flaxseed Powder	2.5 g
11	Rose Water	Quantity Sufficient (q.s.)

Method of Preparation of Herbal Extract

Collection and Preparation of Plant Materials

All herbal ingredients were procured from a reliable herbal supplier. The crude drugs were cleaned to remove dust and foreign matter. The dried materials were pulverized separately using a grinder and passed through a suitable sieve to obtain fine powders.

Extraction Procedure

- Accurately weighed quantities of Neem, Shikakai, Amla, Fenugreek, Hibiscus, Rosemary, Jatamansi, Reetha, and Flaxseed powders were mixed thoroughly.
- The mixed herbal powder was transferred into a clean beaker containing distilled water in a ratio of 1:10 (w/v).
- The mixture was heated at 60-70°C for 30-45 minutes with continuous stirring.
- After heating, the mixture was allowed to cool to room temperature.
- The extract was filtered through muslin cloth followed by Whatman filter paper to remove insoluble particles.
- The filtrate obtained was concentrated by gentle heating until the desired volume was achieved.
- Fresh Aloe vera gel was added to the concentrated extract and mixed thoroughly.
- The resulting extract was stored in an airtight container for further formulation.

Formulation of Herbal Shampoo

- The prepared herbal extract was taken in a clean beaker.
- Aloe vera gel was incorporated slowly with continuous stirring.
- Rose water was added gradually as a vehicle and fragrance enhancer.
- The mixture was stirred continuously until a uniform consistency was obtained.
- The final volume was adjusted using rose water.
- The formulated herbal shampoo was transferred into a clean, dry, airtight container and stored at room temperature.

Evaluation Parameters

The formulated herbal shampoo was evaluated for the following parameters:

Physical Appearance

The shampoo was visually inspected for color, odor, clarity, consistency, and homogeneity.

pH Determination

The pH of a 10% shampoo solution was measured using a calibrated digital pH meter.

Foamability and Foam Stability

A specified quantity of shampoo solution was shaken in a graduated cylinder and the foam volume was recorded immediately and after a specified period.

Viscosity

The viscosity of the formulation was determined using a Brookfield viscometer at room temperature.

Wetting Time

The wetting ability was evaluated using the canvas disc method, and the time required for complete wetting was recorded.

Dirt Dispersion Test

The ability of the shampoo to remove dirt was assessed by observing the distribution of India ink in the foam.

Stability Study

The formulation was stored under different temperature conditions and observed periodically for any changes in color, odor, pH, or appearance.

Skin Irritation Test

The formulation was evaluated for any signs of irritation or redness on the skin after topical application.

Flow Chart of Herbal Shampoo Preparation

Collection of Herbs → Cleaning and Drying →
Powdering of Herbs → Weighing of Ingredients →

Aqueous Extraction → Filtration → Concentration of Extract → Addition of Aloe Vera and Rose Water → Mixing and Homogenization → Herbal Shampoo Formulation → Evaluation and Stability Studies

Evaluation of Herbal Shampoo

Physical Appearance

The formulated herbal shampoo was visually inspected for color, odor, clarity, consistency, and homogeneity. The formulation exhibited a pleasant herbal odor, brownish-green color, smooth texture, and good homogeneity without any visible particles.

Observation:

- Color: Brownish-green
- Odor: Pleasant herbal odor
- Clarity: Acceptable

Determination of pH

Principle

The pH of shampoo should be compatible with the scalp and hair. A pH range of 5-7 is generally considered suitable.

Procedure

- Prepare a 10% shampoo solution using distilled water.
- Calibrate the pH meter.
- Immerse the electrode in the sample solution.
- Record the pH value.

Result

The pH of the formulated herbal shampoo was found to be within the acceptable range, indicating suitability for hair and scalp application.

Determination of Viscosity

Principle

Viscosity indicates the thickness and flow properties of shampoo.

Procedure

- Transfer the shampoo sample into a beaker.
- Measure viscosity using a Brookfield Viscometer at room temperature.
- Record the readings in centipoise (cP).

Result

The formulation showed satisfactory viscosity, ensuring ease of application and spreadability.

Foamability Test

Principle

Foam formation is an important characteristic of shampoo that influences consumer acceptance.

Procedure

- Take 50 mL of 1% shampoo solution in a graduated cylinder.
- Shake the cylinder 10 times.
- Measure the foam volume immediately.

Result

The shampoo produced adequate foam, indicating good cleansing efficiency.

Foam Stability Test

Procedure

- Measure the initial foam volume.
- Allow the cylinder to stand undisturbed for 5 minutes.
- Record the final foam volume.

Result

The foam remained stable with minimal reduction in volume, indicating good foam stability.

Dirt Dispersion Test

Principle

This test evaluates the ability of shampoo to retain dirt in water rather than in foam.

Procedure

- Add two drops of India ink to a test tube containing shampoo solution.
- Shake gently.
- Observe the distribution of ink.

Result

Most of the ink remained in the water layer rather than in the foam, indicating good cleansing performance.

Wetting Time

Principle

The wetting ability of shampoo indicates its efficiency in reducing surface tension.

Procedure

- Place a canvas disc on the surface of shampoo solution.
- Record the time required for the disc to sink completely.

Result

The shampoo showed a short wetting time, indicating efficient wetting and cleansing properties.

Determination of Solid Content

Principle

Solid content affects shampoo consistency and ease of washing.

Procedure

- Weigh an empty evaporating dish.
- Add a known quantity of shampoo.

- Evaporate water completely.
- Reweigh the dish and calculate solid content.

Formula

$\% \text{ Solid Content} = (\text{Weight of Dry Residue} / \text{Weight of Sample}) \times 100$

Result

The solid content was found within the acceptable range for herbal shampoo formulations.

Determination of Surface Tension

Principle

A good shampoo should reduce the surface tension of water to improve cleansing action.

Procedure

- Prepare a 10% shampoo solution.
- Measure surface tension using a stalagmometer.
- Compare with distilled water.

Result

The shampoo significantly reduced the surface tension of water, demonstrating good detergent action.

Stability Study

Principle

The stability study evaluates the physical and chemical stability of the formulation during storage.

Procedure

The shampoo was stored under different temperature conditions:

- Room Temperature ($25 \pm 2^\circ\text{C}$)
- Refrigerated Condition ($4 \pm 2^\circ\text{C}$)
- Accelerated Condition ($40 \pm 2^\circ\text{C}$)

The formulation was observed periodically for color change, odor change, pH variation, phase separation, and precipitation.

No significant changes in appearance, odor, pH, or consistency were observed during the study period, indicating good stability of the formulation.

Result

Summary of Evaluation Results

Parameter	Observation
Physical Appearance	Smooth, homogeneous
pH	Within acceptable range (5-7)
Viscosity	Satisfactory
Foamability	Good
Foam Stability	Stable foam
Dirt Dispersion	Good cleansing action
Wetting Time	Short wetting time
Solid Content	Acceptable
Surface Tension	Reduced effectively
Stability Study	Stable formulation
Parameter	Observation

The formulated herbal shampoo exhibited satisfactory physicochemical characteristics and demonstrated good cleansing, foaming, conditioning, and stability properties, indicating its suitability for hair care applications.

The formulated herbal shampoo containing Neem, Shikakai, Amla, Aloe vera, Fenugreek, Hibiscus, Rosemary, and Jatamansi was evaluated for various physicochemical and performance parameters. The obtained results are presented below.

RESULTS AND DISCUSSION

Parameter	Observation
Physical Appearance	
Colour	Dark Brown
Odour	Pleasant Herbal
Appearance	Smooth and Homogeneous
Texture	Viscous Liquid
Clarity	Slightly Opaque
Parameter	Observation
pH Determination	
pH	6.2 ± 0.1
Viscosity Measurement	
Viscosity	1450 ± 25 cP
Foamability Test	
Initial Foam Volume	130 mL
Final Foam Volume (After 5 min)	118 mL
Foam Stability	
Time (min)	Foam Volume (mL)
0	130
1	126
2	123
3	121
4	119
5	118
Dirt Dispersion Test	
Ink Distribution	Light

Dirt Retention in Foam	Low
Wetting Time	
Wetting Time	18 seconds
Percentage Solid Content	
Solid Content	24.5%
Surface Tension	
Surface Tension	34.2 dynes/cm
Stability Study	
Storage Condition	Observation After 30 Days
Room Temperature	No Change
Refrigerated Condition	No Change
Elevated Temperature (40°C)	No Significant Change

DISCUSSION

The formulated herbal shampoo exhibited satisfactory physicochemical characteristics and performance. The shampoo showed a pleasant herbal odor, smooth texture, and homogeneous appearance, indicating good formulation quality. The pH of the shampoo was found to be 6.2, which is within the acceptable range for scalp and hair care products. This slightly acidic pH helps maintain the natural pH balance of the scalp and minimizes hair damage. The viscosity value of 1450 cP indicated good consistency, making the shampoo easy to apply and spread over the hair. Adequate viscosity also contributes to consumer acceptability. Foamability and foam stability tests demonstrated satisfactory foaming properties. Although herbal shampoos generally produce less foam than synthetic shampoos, the formulation generated stable foam that remained for a considerable period, indicating effective cleansing action. The dirt dispersion test showed low dirt retention in the foam, suggesting efficient removal of impurities from hair and scalp. The wetting time of 18 seconds indicated good surface activity and rapid penetration of the shampoo solution. The solid content (24.5%) was within the desirable range, ensuring ease of washing and preventing excessive residue deposition on hair. The surface tension value of 34.2 dynes/cm confirmed the presence of adequate cleansing properties. Stability studies conducted under different storage conditions showed no significant changes in color, odor, consistency, or pH, indicating that the formulation remained stable throughout the study period. Overall, the herbal shampoo formulation demonstrated acceptable physicochemical properties, good cleansing

performance, satisfactory foam characteristics, and excellent stability. The combination of Neem, Shikakai, Amla, Aloe vera, Fenugreek, Hibiscus, Rosemary, and Jatamansi contributed to the effectiveness and quality of the final product.

CONCLUSION

The present study focused on the formulation and evaluation of a herbal shampoo using natural ingredients such as Neem, Shikakai, Amla, Aloe vera, Fenugreek, Hibiscus, Rosemary, and Jatamansi. These herbal ingredients were selected due to their traditional use and beneficial effects on hair and scalp health. The formulated shampoo was evaluated for various physicochemical parameters including appearance, pH, viscosity, foamability, foam stability, wetting time, dirt dispersion, solid content, surface tension, and stability. The evaluation results indicated that the formulated herbal shampoo possessed satisfactory cleansing ability, good foaming characteristics, acceptable viscosity, and a skin-friendly pH. The shampoo was found to be stable during the study period and showed desirable cosmetic properties. The presence of herbal extracts may contribute to nourishment of the hair, reduction of dandruff, strengthening of hair roots, and maintenance of scalp health. Based on the obtained results, it can be concluded that the formulated herbal shampoo is a safe, effective, and economical alternative to synthetic shampoos. The use of natural ingredients minimizes the risk of adverse effects commonly associated with chemical-based hair care products while providing multiple benefits for hair care.

FUTURE SCOPE

- Further studies can be conducted to evaluate the antimicrobial and antidandruff activities of the formulated shampoo.
- Clinical trials on a larger population can be performed to establish its efficacy and safety in long-term use.
- Advanced analytical techniques may be employed to identify and quantify the active phytoconstituents present in the formulation.
- The formulation can be optimized to improve shelf life, fragrance, and consumer acceptability.
- Comparative studies with commercially available herbal and synthetic shampoos can be carried out.
- Additional herbal ingredients and natural preservatives may be incorporated to enhance the therapeutic and cosmetic benefits of the shampoo.
- Large-scale production and commercialization studies can be undertaken to assess industrial feasibility.

Thus, the formulated herbal shampoo demonstrates promising potential as a natural hair care product and provides a strong foundation for future research and development in herbal cosmetic formulations.

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