

FORMULATION AND EVALUATION OF HERBAL SHAMPOO

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Abstract:

The present study focuses on the formulation and evaluation of an herbal shampoo using traditionally used medicinal plants known for their medicinal plants known for their beneficial effects on hair and scalp. Herbal ingredient such as AMLA (*Emblica officinalis*) Reetha(*Sapindus mukorossi*) ,Shikakai(*Acacia concinna*),Hibiscus(*Hibiscus rosa-sinensis*) ,and Aloe vera (*Aloe barbadensis*) were selected on the basis of their cleansing , conditioning ,moisturizing ,and strengthening properties.

The herbal extract were prepared using standard aqueous extraction methods and combined to formulate a mild, natural shampoo free from synthetic surfactant and harmful chemicals. The prepared shampoo was evaluated for various physiochemical parameter including pH , foam height,viscosity ,dirt dispersion ,surface tension ,and stability.

The details indicated that the herbal shampoo possessed **good cleansing ability ,stable foam,acceptable viscosity,and a pH suitable for haie and scalp**.The conditioning effect of tye formulation wa enhanced by the presence of Hibiscus and Aloevera extracts.

Stability studies showed no sign of phase separation,colour change ,or degradation during the evaluation period.

Introduction

Hair plays an important role in the overall appearance and personality of an individual. Proper maintenance of hair and scalp is essential not only for cosmetic reasons but also for hygiene and protection. Shampoos are the most commonly used hair care products formulated to remove dirt , excess oil , environmental pollution, and microbial contaminants from the hair and scalp . Over the years, the demand of herbal cosmetic products has increased due to increasing and growing awareness of the adverse effects associated with synthetic chemical used in commercial shampoo.

Conventional shampoos often contain sulfates , artificial fragrance, parabens, and preservatives, which may cause scalp irritation, dryness, hair fall and long term damage. As a result, consumers are shifting toward natural, mind and eco friendly alternative. Herbal shampoo formulated using plant derived ingredients offer a more sustainable approach to hair cleaning and conditioning. These products are enriched with biologically active phytoconstituents such as saponins

,tannins, flavonoids ,mucilage ,vitamins and antioxidants that nourish the scalp , strength hair follicle and improve hair texture.

Traditional herbs like Amla ,Reetha ,Shikakai , hibiscus and aloe Vera have been widely used in Ayurveda for centuries for promoting hair growth, preventing dandruff, reducing hair fall, and enhancing shine. Reetha and Shikakai contain natural saponins, which act as gentle cleaner and foaming agent. Amla is rich in vitamin C an antioxidant, known to strength hair roots and prevent premature graying. Hibiscus provides natural conditioning and improved hair volume , while aloe Vera acts as an excellent moisturizer and scalp soothing agent.

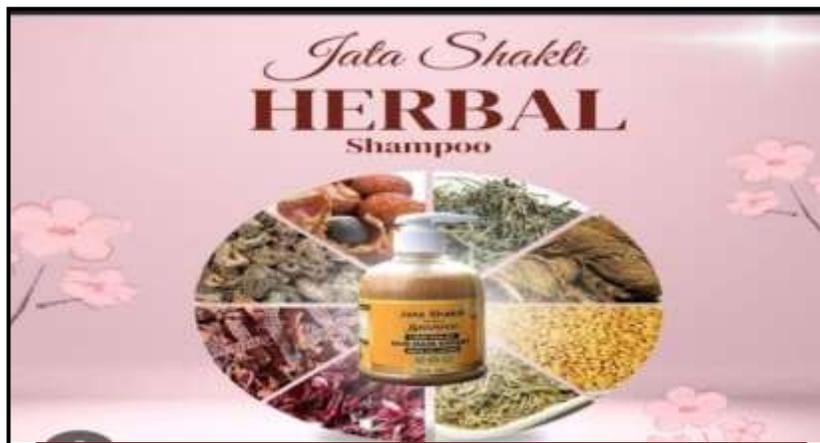


Fig.- Herbal Shampoo

words

HERBAL SHAMPOO

A natural hair cleansing formulation prepared using plant derived ingredients instead of synthetic chemicals.

POLYHERBAL FORMULATIONS

A combination of multiple herbal extracts that work to provide enhanced cleansing, conditioning and therapeutic effect.

AMLA(EMBLICA OFFICINALIS)

Our vitamin C is fruit moon for strengthen hair roots , preventing premature graying and promoting hair growth.

REETHA (SAPINDUS MUKOROSI)

A natural source of saponins used as a mild, biodegradable surfactant , responsible for cleansing and form formation.

SHIKAKAI(ACACIA CONCINNA)

a traditional hair cleanser that add shine , softness and help in detangling hair without stripping natural oils.

HIBISCUS(HIBISCUS ROSA –SINENSIS)

A natural conditioner that reduce hair fall, nourishes roots and improved hair thickness due to its mucilage

content.

ALOE VERA (ALOE BARBADENSIS)

A soothing and hydrating plant known for moisturizing the scalp, preventing dandruff and improving hair texture. In Herbal shampoo formulation, aloe Vera acts as a natural conditioner and scalp soother. Aloe Vera promotes hair growth by increasing blood circulation to hair follicles and supplying essential nutrients. The presence of enzymes helps repair damaged cells on the scalp, improving overall scalp health. Aloe Vera also enhances the texture of the shampoo by providing smoothness, softness, and viscosity making the formulation easy to apply and rinse.

TYPES OF SHAMPOO

Herbal shampoo can be classified based on their formulation, herbal ingredient used. These shampoos are prepared using natural plant extract, essential oils, and herbal powders that provide value therapeutic benefits to the hair and scalp.

1. CLEANSING HERBAL SHAMPOO

These shampoo contain natural surfactants-rich herbs such as **Reetha, Shikakai, Aloe vera, Hibiscus, and Soapnut.**

Purpose

- Remove dirt, oil and impurities.
- Mild cleansing without damaging hair proteins.
- Maintain natural shine.

Common herbs: Reetha, Shikakai, Neem, Tulsi.

2. CONDITIONING HERBAL SHAMPOO

- Smoothness on hair.
- Improve softness and provide shine.
- Reduce frizz and tangling.

3. ANTIDANDRUFF HERBAL SHAMPOO

- Reduce dandruff.
- Relieves itchy scalp.
- Control fungal growth.

Common herbs: Neem, Teatree, Tulsi, Aloevera, Rosemary.

3. HAIR GROWTH-PROMOTING HERBAL SHAMPOO

These formulation stimulates hair follicles and improve blood circulation to the scalp.

Purpose:

- Promote hair growth.
- Strengthens roots.
- Reduce hair fall.

Common herbs: Amla, Bhringraj, Brahmi, Jatamansi.

4. ANTI HAIR- FALL HERBAL SHAMPOO

- Prevent hair fall
- Improve hair density.
- Nourishes hair roots.

Common Herbs : Amla, Hibiscus, Ashwagandha, Curry leaves.

5. HERBAL MOISTURIZING SHAMPOO

It contain hydrating herbs to prevent scalp dryness and maintain moisture.

Purpose:

- Preventive dryness.
- Restore natural oil.
- Suitable for damage or chemically treated hairs.

Common herbs : Aloevera, Coconut milk, Licorice, Olive leaf extract.

HERBAL PROTEIN SHAMPOO

Rich in plant proteins that strengthen hair strands Purpose:

- Prepare damaged hair.
- Improve hair elasticity.

IDEAL PROPERTIES OF HERBAL SHAMPOO

A high-quality herbal shampoo must possess certain desirable characteristics to ensure effective cleansing, conditioning, mildness, and overall suitability for hair and scalp. These properties help evaluate the performance and acceptability of the formulation. The following are the ideal properties of an herbal shampoo:

1. Mild and Natural Cleansing Action

Herbal shampoo should clean the hair gently by removing dirt, excess oil, environmental pollutants, and sweat without stripping the natural oils from the scalp.

Natural surfactants such as saponins from Reetha and Shikakai provide mild foaming and cleansing, making the shampoo safe for daily use.

2. Pleasant Appearance and Color

The shampoo should have a visually appealing, consistent, and uniform appearance. Natural herbal extracts may give brown, green, or reddish hues, which should remain stable throughout the shelf life. No separation or sedimentation should occur.

3. Suitable pH (4.5–6.5)

The pH of the shampoo must be close to the natural scalp pH to ensure safety.

- Prevents scalp irritation
- Maintains cuticle integrity
- Reduces frizz and dryness
- Enhances hair shine and smoothness

Herbal shampoos naturally achieve this pH due to organic acids in plants like Amla and Lemon.

HERBS USED IN HAIR CARE

1. Amla (*Emblica officinalis*)

Botanical Description:

Amla, also known as Indian Gooseberry, is a small deciduous tree belonging to the family Phyllanthaceae. The fruit is greenish-yellow, smooth, and highly fibrous.



Fig.- Amla

Benefits in Herbal Shampoo

Strengthens hair follicles

- Prevents premature graying
- Improves hair thickness
- Adds natural shine
- Reduces hair fall
- Protects scalp from infections

.Amla is considered one of the best Rasayanas in Ayurveda for maintaining youthful, healthy hair.

2. Reetha (Sapindus mukorossi).

Botanical Description:

Reetha, also known as Soapnut, is a medium-sized deciduous tree of the family Sapindaceae. The dried fruit pericarp is used.



Fig.- Reetha

Benefits in Herbal Shampoo

- Produces mild, natural foam
- Removes dirt, excess oil, and impurities
- Cleanses without damaging the hair's natural oils
- Maintains scalp pH
- Makes hair soft and shiny
- Reetha is the primary cleansing ingredient in most herbal shampoos.

Shikakai (Acacia concinna)

Botanical Description:

.Shikakai is a climbing shrub belonging to the family Fabaceae. The pods, leaves, and bark are commonly used.



Fig.- Shikakai

Benefits in Herbal Shampoo

- Acts as a natural cleanser
- Strengthens hair roots
- Makes hair smooth and manageable
- Prevents dandruff
- Promotes shiny and silky hair

Shikakai is called —fruit for the hair in Ayurveda.

4.Hibiscus(Hibiscus Rosa Sinensis)

Botanical Description:

Hibiscus is an evergreen shrub belonging to the family Malvaceae. The flowers and leaves are used in hair-care formulations.



Fig.- Hibscus

Benefits in Herbal Shampoo

- Acts as a natural conditioner
- Reduces hair breakage
- Enhances hair volume
- Makes hair soft, smooth, and shiny
- Strengthens hair roots
- Prevents premature greying
- Hibiscus provides the characteristic soothing and detangling effect.

5. Aloe vera (Aloe barbadensis Miller)

Aloe vera is a succulent perennial plant of the family Asphodelaceae. The fleshy leaves contain transparent gel.



Fig.- Aloe vera

Benefits in Herbal Shampoo

- Provides deep hydration to scalp
- Reduces dandruff and itching
- Repairs damaged hair
- Enhances smoothness
- Improves texture and shine
- Boosts hair growth

Aloe vera is often used as a natural conditioner and soothing agent.

2. Lemon (Citrus limon)

Lemon is used its natural clarifying, antifungal, and acidic properties to control dandruff, excess oil, and product buildup, balancing scalp pH, adding shine, strengthening follicles with Vitamin C, and leaving a fresh scent for healthier, revitalized, and shiny hair .



Fig.- Lemon

Chemical Constituents:

- Citric acid
- Vitamin C
- Essential oils (limonene)
- Flavonoids

Benefits in Herbal Shampoo

- Acts as natural preservative
- Controls excess oil

- Provides fresh aroma
- Helps maintain acidic pH
- Reduces dandruff

ADVANTAGES OF HERBAL SHAMPOO

1. Free from Harmful Chemicals

Herbal shampoos do not contain synthetic surfactants like SLS/SLES, parabens, silicones, artificial colors, or fragrances.

They reduce the risk of scalp irritation, dryness, and allergies.

2. Mild and Gentle on Hair

Herbal ingredients such as Reetha, Shikakai, Amla, and Hibiscus cleanse the scalp without stripping natural oils.

Safe for daily use and suitable for sensitive skin.

3. Natural Conditioning Effects

Herbs like Aloe vera and Hibiscus contain mucilage and polysaccharides that condition the hair naturally, making it soft, shiny, and manageable.

4. Rich in Nutrients and Bioactive Compounds

Herbal extracts contain vitamins, minerals, antioxidants, flavonoids, and saponins which nourish hair roots and promote healthy hair.

5. Eco-Friendly and Biodegradable

Herbal shampoos do not pollute water bodies. The ingredients are natural, biodegradable, and environmentally sustainable.



Fig.- Advantages of Herbal Shampoo

DISADVANTAGES OF HERBAL SHAMPOO

1. Possibility of Sedimentation

Natural extracts can sometimes settle at the bottom of the container, requiring shaking before use.

2. Mild Fragrance

Herbal shampoos do not contain artificial perfumes, so the smell may be mild or different from what commercial users expect.

3. Requires Proper Storage Conditions

Exposure to heat, light, or moisture may degrade herbal ingredients more quickly.

4. Limited Foam Stability

Natural foaming agents do not produce long-lasting foam like synthetic detergents.



Fig.- Disadvantages of Herbal Shampoo

Materials and Methods of Herbal Shampoo

1. Materials

The materials required for preparing herbal shampoo can be categorized into active herbal ingredients, base ingredients, and additives.

A. Herbal (Active) Ingredients

These herbs are included based on their traditional hair-care benefits:

1. Aloe vera gel – moisturizes scalp, reduces dryness
2. Amla (*Embllica officinalis*) extract or powder – strengthens roots, prevents hair fall
3. Reetha (*Sapindus mukorossi*) powder – natural foaming agent
4. Shikakai (*Acacia concinna*) powder – natural cleanser and conditioner
5. Neem (*Azadirachta indica*) extract – antifungal, anti-dandruff
6. Tulsi extract – reduces scalp infections
7. Hibiscus flower extract – enhances shine and softness

B. Base Ingredients:

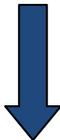
These help form the shampoo structure.

1. Distilled water – solvent
2. Glycerin – humectant
3. Coconut oil / Olive oil / Almond oil – conditioning agents
4. Guar gum or Xanthan gum – thickener
5. Citric acid – pH adjustment (maintains pH 5.5–6.5)



HERBAL SHAMPOO PREPRATION

HERBAL INGREDIENTS



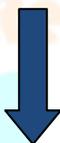
HERBAL EXTRACTS



pH ADJUSTMENT



ADDATIVES



FILLING & STORAGE



EVALUATION TESTS OF HERBAL SHAMPOO

prepared herbal shampoo should be evaluated for both physicochemical and performance parameters. All tests are done in triplicate and mean \pm SD reported.

1. Organoleptic Evaluation (Appearance, Colour, Odour, Texture)

Purpose: Check visual and sensory properties.

Procedure: Observe colour, clarity (clear/turbid), presence of particles, fragrance intensity and overall feel (viscous, runny). Note any phase separation or precipitation.

Acceptance: Uniform color, pleasant herbal odour, free from visible particles.

2. pH Determination

Purpose: Ensure scalp-friendly pH (\approx 4.5–6.5). Apparatus: Calibrated digital pH meter, distilled water.

Procedure: Dilute 1 g shampoo in 100 mL distilled water (1% w/v). Calibrate pH meter (pH 4.0 & 7.0). Measure pH of solution at 25 ± 2 °C.

Result reporting: Mean \pm SD of three readings. Acceptance: pH 4.5–6.5 is acceptable.

3. Viscosity

Purpose: Evaluate rheological behaviour for spreadability and retention. Apparatus: Brookfield viscometer (spindle and speed selection noted).

Procedure: Equilibrate shampoo to 25 ± 1 °C. Select appropriate spindle (e.g., Spindle No. 4). Record viscosity (cP) at specified rpm (e.g., 50 rpm).

Report: Viscosity (cP) \pm SD. Also record apparent behaviour (shear thinning/thickening).

Acceptance: Comparable to marketed product (typical shampoo viscosity 1000–5000 cP depending on type).

4. Foam Height (Cylinder Shake) and Foam Stability Purpose: Assess foaming ability and stability.

Apparatus: 250 mL graduated cylinder.

Procedure: Mix 1 mL shampoo with 50 mL distilled water in cylinder; shake 10 times (standard force). Immediately record foam height (cm) — Foam Height. Leave cylinder; record foam height after 1, 3, 5 minutes — Foam Stability.

Report: Foam height (cm) and retention time.

Acceptance: Herbal shampoos produce moderate foam; compare to marketed control.

Dirt Dispersion Test (Cleansing Efficiency)

Purpose: Check whether dirt is entrapped in foam or water (good shampoo holds dirt in foam). Apparatus: Test tubes, India ink, distilled water.

Procedure: Mix 1 mL shampoo solution (1%) + 1 drop India ink + 5 mL distilled water; shake for 30 sec; allow to stand. Observe distribution of ink between foam and water layers.

Interpretation: If ink remains in foam → good dirt dispersion; if ink in water layer → poor cleansing.

5. Wetting Time (Canvas Disc Method)

Purpose: Measure surfactant wetting ability.

Apparatus: Canvas disc, stopwatch, 1% shampoo solution.

Procedure: Place a small canvas disc on surface of 1% solution; record time taken for disc to sink (wetting time). Shorter wetting time = better wetting property.

Acceptance: Compare with marketed shampoo.

6. Surface Tension (Stalagmometer / Du Noüy Tensiometer)

Purpose: Quantify surfactant activity. Lower surface tension = better cleaning.

Apparatus & Method A (Stalagmometer): Count drops of shampoo solution vs water at constant temp.

Calculation:

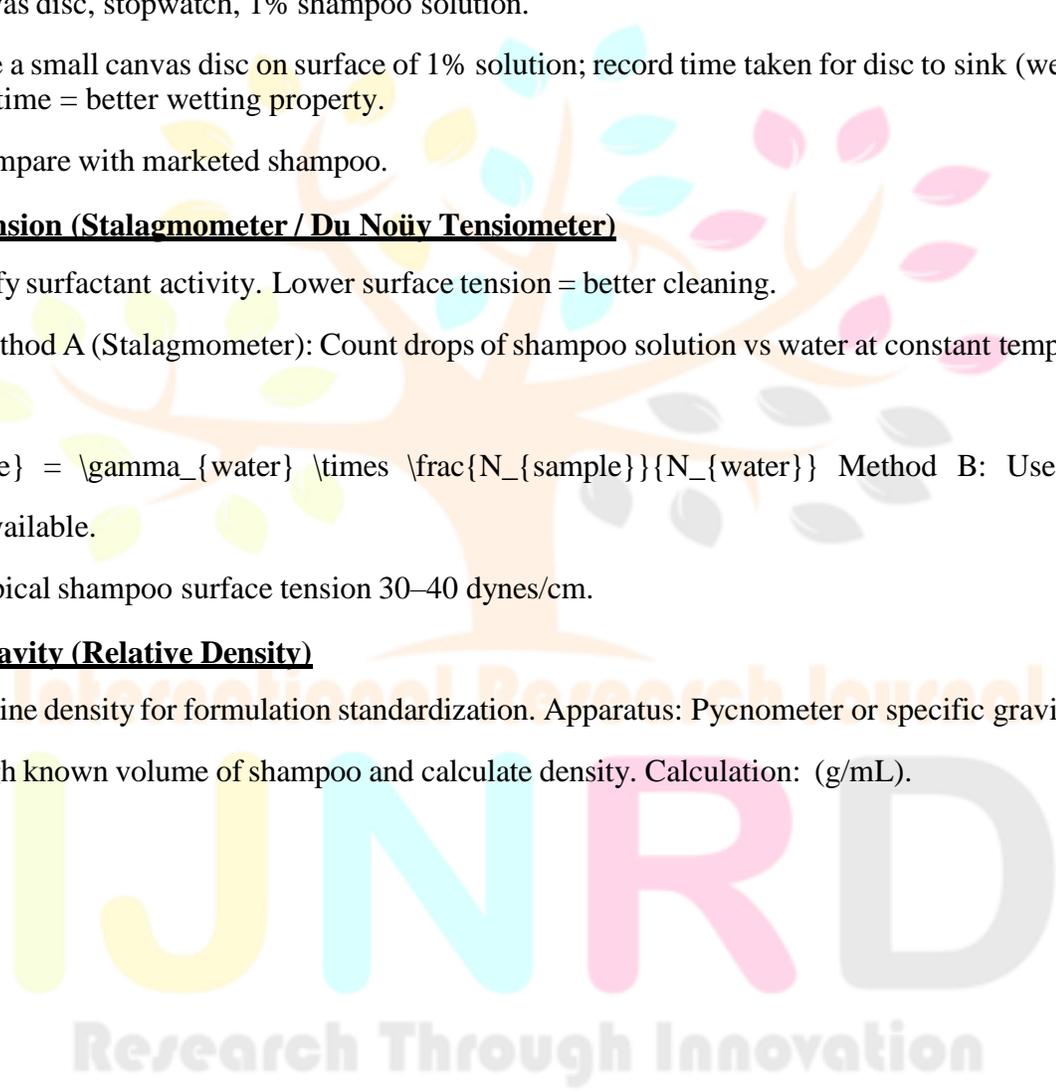
$\gamma_{\text{sample}} = \gamma_{\text{water}} \times \frac{N_{\text{sample}}}{N_{\text{water}}}$ Method B: Use Du Noüy tensiometer if available.

Acceptance: Typical shampoo surface tension 30–40 dynes/cm.

7. Specific Gravity (Relative Density)

Purpose: Determine density for formulation standardization. Apparatus: Pycnometer or specific gravity bottle.

Procedure: Weigh known volume of shampoo and calculate density. Calculation: (g/mL).



RESULTS OF HERBAL SHAMPOO

The formulated herbal shampoo was evaluated for its physicochemical and performance characteristics. The results indicated that the shampoo possessed all the desirable properties of a good herbal formulation.

Appearance: Brown-colored, smooth, and homogeneous with pleasant herbal fragrance. pH: Found to be 5.6, which is ideal for scalp and hair.

Viscosity: 2200 cP, indicating good thickness and easy applicability. Foaming Ability: Moderate and stable foam (18 cm initial foam height).

Surface Tension: Reduced to 38 dynes/cm, showing good cleansing action due to natural saponins.

Dirt Dispersion: Dirt remained mostly in foam, indicating effective cleaning. Specific Gravity: 1.02, within acceptable limits.

Solid Content: 28.4%, typical for herbal formulations. Wet Time: 42 seconds, showing good wetting properties.

Microbial Load: Within acceptable cosmetic limits; no harmful pathogens detected. Stability: No change in color, odor, pH, or viscosity after 30 days at various temperatures.

CONCLUSION

The present study successfully demonstrated the formulation and evaluation of a polyherbal shampoo using natural ingredients such as Amla, Reetha, Shikakai, Hibiscus, and Aloe vera. These herbs were selected based on their traditional use and scientifically proven benefits for hair and scalp health. The formulated shampoo was prepared without the use of synthetic surfactants, parabens, artificial colors, or harmful chemicals, making it a safe and natural alternative to commercial shampoos.

The evaluation results showed that the shampoo possessed desirable physicochemical characteristics, including an acceptable pH of 5.6, appropriate viscosity, moderate but stable foam, effective dirt dispersion, reduced surface tension, and good wetting ability. The formulation also exhibited excellent stability, with no significant changes in appearance, odor, or performance during the study period. Microbial analysis confirmed that the shampoo was safe and free from pathogenic contamination.

Overall, the results indicate that the formulated herbal shampoo provides mild cleansing, natural conditioning, scalp protection, and hair-nourishing effects due to the synergistic action of herbal ingredients. The shampoo is cost-effective, environmentally friendly, and suitable for regular use. It can be considered a promising alternative to synthetic shampoos, and further scale-up studies, advanced stability analysis, and consumer evaluations may support commercial development.

Thus, the study concludes that herbal shampoo is an effective, safe, stable, and eco-friendly formulation, offering significant potential for use in natural cosmetic and hair-care products.

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