



Formulation and Evaluation of Herbal Shampoo Powder

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ABSTRACT:

The present study focuses on the formulation and evaluation of an herbal powder shampoo composed entirely of natural ingredients, offering an effective and safer alternative to synthetic shampoos. Herbal ingredients such as Ritha, Neem, Henna, Shikakai, and Hibiscus were selected for their traditional uses and therapeutic benefits, including antimicrobial, cleansing, conditioning, and hair growth-promoting properties. The powdered shampoo was prepared through a systematic process involving drying, grinding, mixing, and sieving to ensure uniformity and quality. The formulation underwent comprehensive evaluation based on organoleptic properties, physicochemical parameters (such as ash value, moisture content, and pH), flow characteristics (bulk and tapped density, Hausner ratio, Carr's index), and functional tests (cleaning action, foaming capacity, wetting time, and dirt dispersion). Results indicated that the herbal shampoo exhibited desirable physicochemical and functional attributes, along with good cleansing efficiency and foaming ability, without causing skin or eye irritation. These findings suggest that the formulated herbal shampoo powder is a promising, natural alternative for maintaining hair health with minimal risk of side effects.

Keywords: Herbal shampoo, powder formulation, natural ingredients, Ritha, Shikakai, Neem, Henna, Hibiscus, physicochemical evaluation, cleansing efficiency, foaming capacity.

INTRODUCTION:

Since ancient times, people have used herbs for cleansing, enhancing appearance, and managing hair, as hair has long been regarded as a vital aspect of human beauty [1]. The primary component of hair is keratin—a resilient protein known for its resistance to damage and degradation. Over the years, synthetic substances have become dominant in cosmetic formulations. However, there is now a growing preference for natural products, largely due to their affordability and minimal side effects, as synthetic products are often associated with adverse effects on the skin, hair, and eyes [2].

Shampoos serve more than just a cleansing function; they also help keep hair soft, shiny, thick, long, and free of excess oil. There is a wide variety of shampoo types, such as powder shampoos, clear liquid shampoos, lotion shampoos, solid gel shampoos, medicated shampoos, and liquid herbal shampoos [3, 4].

The classification of shampoos depends on the nature of their ingredients. They may be categorized as basic shampoos, anti-dandruff shampoos, antiseptic shampoos, or nutritional shampoos enriched with vitamins, amino acids, and protein hydrolysates [5].

Hair continues to be considered a core element of personal beauty. Throughout history, herbs have been used to cleanse and care for it. Although synthetic agents became popular in more recent times, growing awareness of their harmful effects has driven many people to seek herbal alternatives. These natural products are typically safer, more cost-effective, and pose fewer side effects.

Hair cleansers, or shampoos, are designed not only to clean the scalp and hair but also to enhance shine, manageability, and control oiliness [17]. Various shampoo forms exist, including powder, clear liquid, lotion-based, solid gel, medicated, and herbal liquids. Herbal shampoos, in particular, are valued for their stability and natural formulation. Depending on the ingredients used, they may serve as basic, antiseptic, anti-dandruff, or nutritional shampoos enriched with beneficial nutrients like vitamins, amino acids, and protein hydrolysates [17].



MATERIALS AND METHODS

Formulation of Powder Shampoo

The formulated herbal shampoo powder offers a safer alternative to shampoos containing synthetic agents. It not only helps reduce dandruff and hair fall but also strengthens the hair. The ingredients used in the formulation provide additional benefits:

Ritha (*Sapindus mukorossi*):

Ritha, also known as washnut, soapnut, or soapberry, is the dried fruit of *Sapindus mukorossi*, a plant belonging to the family Sapindaceae. It is renowned for its antibacterial, antifungal, and cleansing properties, and also acts as an exfoliant and natural insect repellent. The fruit is rich in saponins (10–11.5%), sugars (approximately 10%), mucilage, triterpenes, and six identified sapindosides (A, B, C, D, E1, and Y1), collectively referred to as mukorossi saponins.

Ritha is widely used in herbal hair care for its ability to enhance hair shine, address scalp issues, and naturally cleanse the hair. Due to its inherent detergent and foaming properties, it serves as an effective and eco-friendly base in natural shampoos and cleansers.



Figure: 1(Soap nut Fruit)

Neem (*Azadirachta indica*):

Neem, commonly known as Margosa, consists of the aerial parts of the plant *Azadirachta indica*, a member of the Meliaceae family. Neem leaves are rich in astringent, antiseptic, antibacterial, and antiviral properties, making them effective in the treatment of itching, scabies, boils, swelling, and head lice infestations.

The plant contains a diverse range of bioactive compounds including diterpenes (such as sugiol and nimboil), triterpenes (including β -sitosterol and stigmasterol), and potent limonoids like meliantriol, nimbidin, nimbin, and azadirachtin. These constituents contribute to its broad therapeutic applications.

Neem is widely utilized for its antimicrobial, insecticidal, insect repellent, and antibacterial actions, making it a valuable component in both traditional medicine and modern herbal formulations.



Figure:2(Neem Leaf)



Henna (*Lawsonia inermis*):

Henna is a flowering shrub native to North Africa, the Middle East, and South Asia, belonging to the Lythraceae family. Its leaves contain lawsone, a natural pigment that has been used for centuries as a dye for body art and hair coloring, and in traditional medicine.

Beyond its cosmetic applications, henna serves as a cooling agent and exhibits notable antimicrobial and anti-inflammatory properties. These therapeutic actions make it beneficial in managing a variety of skin conditions, including rashes, irritations, and minor wounds.

Henna also holds deep cultural significance, especially in ceremonial practices such as weddings and festivals, where it is used for decorative body art. Today, it continues to be widely used in cosmetic, therapeutic, and cultural contexts across the globe.



Figure:3(Heena Leaf)

Shikakai (*Acacia rugata*):

Shikakai, commonly known as soap-pod, is the dried seed of the *Acacia rugata* plant, which belongs to the Leguminosae (Fabaceae) family. It has long been valued in Ayurvedic medicine for its cleansing properties and is traditionally used in herbal shampoos and detergents.

The seed extract of Shikakai contains a variety of bioactive compounds, including lupeol, spinasterol, acacic acid lactone, and natural sugars such as glucose, arabinose, and rhamnose. It also includes acids like hexacosanol, oxalic acid, tartaric acid, citric acid, succinic acid, ascorbic acid, and traces of nicotine.

Shikakai acts as a natural foaming agent, making it an ideal ingredient in hair care formulations. It is well known for gently cleansing the scalp without stripping away natural oils, promoting hair health, and preventing dandruff and scalp irritation.



Figure:4 (Shikakai)



Hibiscus (*Hibiscus rosa-sinensis*):

Hibiscus, commonly known as Chinese hibiscus or shoe flower, is a tropical evergreen shrub belonging to the Malvaceae family and is native to Asia. It is renowned for its large, vibrant, trumpet-shaped flowers and is widely cultivated as an ornamental plant in tropical and subtropical climates.

Beyond its decorative value, hibiscus is traditionally used to promote hair growth. The plant contains flavonoids, vitamin C, amino acids, and natural mucilage, which help strengthen hair roots, enhance scalp circulation, and provide conditioning benefits. It is commonly used in Ayurvedic preparations for treating hair loss, dandruff, and premature greying.

In the preparation of the herbal shampoo, hibiscus powder was included as one of the key ingredients. All powdered components were mixed thoroughly in increasing order of their weight, using continuous trituration to ensure homogeneity and uniform distribution throughout the formulation.



Figure:5 (Hibiscus)

Table: 1 Formulation of Powder Shampoo

Sr. No.	Ingredients	Uses	Quantity for 100gms.
1	Ritha Fruit	Detergents	20%
2	Neem Leaf	Antidandruff	15%
3	Shikakai	Foam base	15%
4	Henna	Nourishing and Conditioning	15%
5	Hibiscus	Hair growth	20%

PREPARATION PROCEDURE OF HERBAL SHAMPOO POWDER [10–14]

The herbal shampoo powder was prepared through the following sequential steps:

1. Drying:

All raw herbal ingredients were shade-dried to preserve their active constituents and then ground into powder form.

2. Weighing and Size Reduction:

Each dried herbal material was accurately weighed as per formulation requirements. The materials were further size-reduced using a hand-operated grinder to ensure uniform particle size.



3. Mixing:

The powdered ingredients were initially ground separately. About 20% of each powder was combined, and the remaining portions were gradually added and mixed thoroughly. This step ensured even distribution of all components.

4. Sieving:

The blended powder was mixed uniformly with a stainless-steel spatula and then passed through sieve no. 125 to achieve a consistent fine texture.

5. Packing and Labeling:

The final homogenized powder was transferred into suitable containers, securely packed, and labelled for identification and future use.

EVALUATION OF SHAMPOO POWDER: -

The formulated herbal shampoos were assessed using the following evaluation criteria:

1. Organoleptic Evaluation:

A random sample was selected to assess sensory attributes such as color, odor, taste, and texture. Color and texture were evaluated visually and through touch, respectively. For taste and odor assessment, a panel of five individuals with heightened sensitivity to taste and smell was assembled, and random sampling was conducted [11].

2. General Powder Characteristics:

This evaluation focused on external features that influence product quality such as flow properties, physical appearance, and packaging suitability [12,13].

- **Particle Size:**

Particle size affects characteristics like spread ability and grittiness. Measured using the sieving method with Indian Pharmacopoeia (I.P.) standard sieves and mechanical shaking for 10 minutes, particle size affects spread ability and grittiness.

- **Angle of Repose:**

This parameter reflects the flow behavior of the powder. It was determined using the funnel method, where a 2 cm gap was maintained between the base of the funnel and a marked graph sheet. Powder was allowed to flow until the apex of the formed pile touched the funnel tip. The angle of repose (θ) was calculated using the formula:

$$\theta = \tan^{-1} (h / r)$$

Where:

h = height of the powder heap

r = radius of the base

- **Bulk Density:**

5 grams of powder was added to a 100 ml graduated cylinder and placed in a bulk density apparatus. The bulk density, expressed in g/cm^3 , is essential for evaluating packaging efficiency and product uniformity.

- **Tapped Density:**

To determine tapped density, 5 grams of powder was placed in a 100 ml graduated cylinder and tapped mechanically for one minute. Tapping continued until minimal volume change was observed. The final volume was used to calculate the tapped density, also expressed in g/cm^3 .



- **Hausner Ratio;**

The Hausner ratio is a measure of the flowability of a powder, including herbal shampoo powders. It's calculated by dividing the tapped density by the bulk density.

$$\begin{aligned} &\bullet \text{ Hausner Ratio} = \frac{\text{Tapped Density}}{\text{Bulk Density}} \end{aligned}$$

- **Carr's Index;**

Carr's Index is a measure of a powder's flowability, and it's calculated using the bulk density and tapped density.

$$\begin{aligned} &\bullet \text{ Carr's Index} = \frac{(\text{Tapped Density} - \text{Bulk Density})}{\text{Tapped Density}} \times 100 \end{aligned}$$

Which also reflects powder flow properties.

3. Physicochemical Parameters:

- **Ash Value**

Ash value is used to estimate the total inorganic content present in a herbal material, which helps in identifying its purity and quality. About 2 grams of the powdered sample was placed in a pre-weighed and ignited silica dish. The sample was gradually heated without exceeding a red-hot temperature until complete incineration. After cooling, the remaining ash was weighed. [14]

- **Acid-Insoluble Ash:**

The total ash obtained was boiled with 25 ml of dilute hydrochloric acid for 5 minutes. It was then filtered, and the residue on the filter paper was washed with hot water. The remaining insoluble matter was used to determine the acid-insoluble ash content.

- **Moisture Content:**

A 10-gram sample was placed in a pre-weighed evaporating dish and dried in a hot air oven at 105°C. The sample was weighed at 15-minute intervals until a constant weight was achieved, indicating the moisture content.

- **pH Measurement:**

1 gram of the powder was dissolved in 10 ml of distilled water, and the pH of the solution was measured using a calibrated pH meter.

3. Cleaning Action:

To test cleaning efficiency, 5 grams of wool yarn or a cotton ball was greased and then immersed in 200 ml of water containing 1 gram of the shampoo sample. The mixture was shaken for 4 minutes. The sample was then removed, dried, and weighed. The amount of grease removed was calculated using the following formula:

$$\% \text{ Detergent Action} = 100 \times \frac{(1 - \text{Weight of grease after washing})}{\text{Initial weight of grease}}$$

4. Foaming Capacity:

2 grams of the shampoo powder were placed in a 250 ml graduated cylinder with 50 ml of water. The solution was shaken 10 times, and the volume of foam was recorded after 1 minute. Foam stability was then measured at 5-minute intervals [15,16].

5. Dirt Dispersion:

A 1% shampoo solution was prepared by dissolving 1 gram of the sample in 10 ml of water. One drop of methylene blue dye was added, and the solution was shaken 10 times in a stoppered test tube. The presence of the dye in the foam was assessed to determine dirt dispersion efficiency.

6. Wetting Time:

Canvas discs (1 inch in diameter, weighing 0.45 grams) were floated on the surface of a 1% shampoo solution. The time taken for each disc to sink completely was recorded as the wetting time.

7. Hair Condition Post-Wash:

A small amount of the shampoo powder was applied to hair and rinsed off. Observations were made on the texture, softness, and overall condition of the hair after washing.



8. Skin and Eye Irritation Test:

Tests for skin and eye irritation indicated that the herbal shampoo powder caused no adverse reactions. This is attributed to the absence of synthetic surfactants, which are known to cause eye inflammation and skin irritation. Since the formulation is entirely based on natural ingredients, it is safe for regular use and does not harm the skin or eyes.

RESULTS AND DISCUSSION:

Organoleptic Evaluation:

These assessments were conducted manually, and the observations are summarized in Table 2.

General Powder Characteristics:

The particle size of the powder was measured to be between 20 and 25 μm . The angle of repose was recorded as $28^\circ \pm 1.03$, indicating good flow properties. The bulk density was determined to be 0.454 g/cm^3 , while the tapped density was found to be 0.625 g/cm^3 .

Table: 2

Sr. No.	Evaluation parameters		Observation
1	Organoleptic evaluation	Colour	Yellowish brown
		Odour	Slightly pleasant
		Taste	Bitter
		Texture	Fine and smooth
2	General powder characters	Particle size	20 – 25 $\mu\text{m} \pm$
		Angle of response	$52.56^\circ \pm 1.03$
		Bulk density	0.41 g/cc
		Tapped density	0.625 g/cc
		Hausner ratio	1.52
		Carr's Index	34.4
3	Physicochemical evaluation	Ash value	
		1.Total ash	10%
		2.Acid insoluble ash	1.77%
		Moisture content	0.53%
		pH	6.8
4	Cleaning action		Moderate
5	Foaming		Good foaming
6	Dirt dispersion		Moderate
7	Wetting time		2min.28sec
8	Nature of hair after washing		Soft manageable

Table: 3

Calculation for Angle of Repose of Polyherbal Shampoo Powder:

Method	Height of cone (cm)	Radius of cone (cm)	$\tan \theta = (h/r)$	Average $\tan \theta$	$\theta = \tan^{-1} (h/r)$	Flow property
Funnel method	3.43	2.63	1.30	1.30	52.56°	Good flow

PHYSICOCHEMICAL EVALUATION:

- The **total ash content** of the formulation was measured at **10% w/w**, while the **acid-insoluble ash** was **1.77% w/w**, indicating minimal inorganic contamination.



- The **moisture content** was determined to be **0.53%**, and the **pH** of the shampoo was **6.8 ± 1**, which is suitable for scalp and hair health.
- The **cleaning efficiency** of the formulation was **32 ± 0.32**, demonstrating effective cleansing performance. The shampoo also produced a stable foam, contributing to good user compliance.
- The **dirt dispersion** ability of the shampoo was assessed as **moderate**.
- The **wetting time** was recorded at **2 minutes and 28 seconds**, indicating reasonable surface wetting.
- After use, the **hair texture** was observed to be **soft and easy to manage**.

DISCUSSION:

The medicinal plants utilized in the herbal shampoo formulation—namely Henna, Reetha, Neem, Hibiscus flower, and Shikakai—are well-recognized for their therapeutic properties. These botanicals have been extensively reported to promote hair growth and enhance hair conditioning. The quality control evaluations conducted on the formulated shampoo powder revealed consistently favorable results across all parameters.

The study's findings suggest that the integration of these herbal ingredients into shampoo formulations not only produces a stable product but also enhances its aesthetic attributes. The shampoo's pH level was found to be optimal, playing a vital role in improving hair quality, minimizing eye irritation, and maintaining the natural balance of the scalp.

Contemporary shampoo formulations increasingly favor lower pH values to reduce hair damage, and the results obtained in this study align with these preferences, supporting the product's efficacy and user safety. Despite being in powder form, the shampoo exhibited excellent wetting properties, contributing to effective cleansing. Additionally, the dry formulation offers advantages such as improved shelf-life and easier long-term storage.

CONCLUSION:

A review of global hair care market trends reveals a significant rise in consumer preference for herbal products in recent years. Factors such as exposure to UV radiation and the use of harsh chemical-based hair products have both direct and indirect negative effects on hair health. To address these concerns, the present study aimed to develop an herbal shampoo that not only protects the hair but also offers conditioning, shine, and manageability.

This research highlights the cosmetic potential of herbal extracts. Based on the findings, the formulated polyherbal shampoo powder proves effective in reducing dandruff, with minimal irritation and side effects, while also delivering superior conditioning benefits. However, despite its safety and performance advantages over synthetic shampoos, herbal shampoo formulations may still face challenges in gaining widespread consumer acceptance.

The development of this formulation was guided by traditional knowledge regarding the benefits of the selected herbs, along with an emphasis on improving parameters such as the quality and purity of the shampoo. Standardization and thorough evaluation of the polyherbal shampoo powder were conducted. Parameters including organoleptic characteristics, general powder properties, physicochemical traits, cleansing ability, foaming capacity, dirt dispersion, wetting time, and post-wash hair condition were all assessed and found to fall within acceptable standard limits.

REFERENCES:

1. Sutar Manisha, Deshmukh Swati, Chavan Manisha, Singal Sonia. Preparation and evaluation of Polyherbal shampoo powder. International Journal of Pharmacy and Biological Science. 2013; 3 (2): 151-159.
2. Mainkar AR, Jolly CI. Formulation of natural shampoos. International Journal of Cosmetic Science. 2001; 23: 59-62.
3. Nasrin Aghel, Eskandar Moghimipour, Azadeh Raies Dana. Formulation of a Herbal Shampoo Using Total Saponins of *Acanthophyllum squamosum*. Iranian Journal of Pharmaceutical Research, 2007; 6 (3): 167-172.
4. Sachin Dubey, Neelesh Nema, Nayak S, Preparation and Evaluation of Herbal Shampoo Powder. Ancient Science of Life. 2004, XXVI, 38-44.



5. Swati Deshmukh, Bindurani Kaushal, Shweta Ghode, Formulation and evaluation of herbal shampoo and comparative studies with herbal marketed shampoo. International Journal of Pharmacy and Bio Science. 2012; 3 (3): 638-645.
6. Anil kumar, Ashatha Singh. Review on Hibiscus rosasinensis, International Journal of Research in Pharmaceutical and Biomedical Science. 2012; 3 (2): 534-538.
7. Jukantil AK, Gauri PM, Gowdal CLL, Chibbar RN. Nutritional quality and health benefits of chick pea. British Journal of Nutrition. 2012; 108: 11-26.
8. Kokate C. K., Purohit A. P, Gokhale S. B, Pharmacognosy, 41st Ed, Nirali Prakashan, 16.12-16.14, (2008)
9. Wallis TE. Textbook of Pharmacognosy. 5th edition. CBS Publishers: 195.
10. Lachman L., Lieberman H.A., Kanig J.L. The Theory and Practice of Industrial Pharmacy. 3rd edition. Varghese Publishing House, Bombay; 1991, 67.
11. Kapoor VP. Herbal Cosmetics for Skin and Hair Care. 2005, vol 4, 306-314.
12. Indian Pharmacopoeia. The Indian Pharmacopoeial Commission, Ghaziabad; 2007.
13. Martin Alfred. Physical pharmacy. 4th edition Lea & Febigen Philadelphia: London; 1993, 431-432.
14. Sharma P.P. Cosmetics Formulation, Manufacturing and Quality Control. 3rd edn. Vandan Publications, Delhi; 1998, 644- 647.
15. Noudeh G.D., Sharififar F., Khazaeli Payam et al. Formulation of herbal conditioner shampoo by using extract of fenugreek seeds and evaluation of its physicochemical parameters. African Journal of Pharmacy and Pharmacology. 2011; 5(22): 2420-2427.
16. Paithankar V. V. Formulation and evaluation of herbal cosmetic preparation using safed musli. 2010; 2(4): 2261-2264
17. Sachin Dubey, Neelesh Nema, Nayak S. Preparation and evaluation of herbal Shampoo powder. Ancient Science of Life 26(1); 2004: 38-44.

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