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## Formulation And Evaluation of Herbal Anti-Dandruff Shampoo

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### ABSTRACT :

Dandruff is the major problem for many people in today's world. Shampoo are the product eliminates dust and surface oil from the scalp and hair shaft. Since the majority of ingredients are chemicals, they have been heavily criticized for the possible negative effects of their use. This study's primary goal was to get rid of dangerous synthetic compounds. Dandruff can only be adequately treated and controlled; it cannot be totally eradicated. When applied under the recommended conditions, a shampoo—a preparation that contains surfactant in a suitable liquid, solid, or powder form—will remove surface oil, grime, and skin debris from the hair shaft and scalp without negatively affecting the user. Shikakai, Neem, Reetha, Fenugreek, Amla, Aloe Vera gel, and other herbal-based ingredients were used to create herbal anti-dandruff shampoo. A base shampoo was also prepared. Evaluation criteria such as visual inspection, pH, viscosity, percentage of solid content, dirt dispersion, skin irritation test, foaming ability, and foam stability were applied to the shampoo formulation.

**Keywords:** Dandruff, Natural Herbs, Surfactant, Antidandruff Shampoo, Evaluation

### INTRODUCTION

Dandruff is a harmless, chronic condition that occurs when the scalp becomes dry or greasy and produces white flakes of dead skin that appear in the hair or on the shoulders. Even while dandruff is harmless, people who have it may find it embarrassing. Skin cells are formed continuously on the scalp, so the shedding of the dead skin cells is normal process. With dandruff, however skin cells are shed at a faster rate than normal, oil from the scalp causes the skin cells to clump together and appear as white flakes.

A shampoo may be described as a surfactant preparation (specifically surface-active substance) in a suitable liquid, solid, or powder form that, when applied as directed, eliminates surface oil, grime, and skin debris from the hair, shaft, and scalp without negatively impacting the hair, Scalp, or user's health. Shampoo assessment involves quality control measures including visual examination, and physiological regulators like density, viscosity, and pH. The most popular detergents are those based on sodium lauryl sulphate, however brand-to-brand variations in concentration might also within the product range of a supplier. Most likely, shampoos are utilized as cosmetics. Shampoos are a viscous mixture of detergents with appropriate additions, preservatives, and active substances that are most commonly used as beautifying agents. Shampoo is meant to remove accumulated dirt from hair without removing a significant amount of sebum.

A more drastic strategy for making herbal shampoo more widely used would be to alter customer expectations by emphasizing efficacy and safety. Shampoos are typically composed of 10 to 30 ingredients. Many medicinal plants that may have hair-related benefits have been utilized for centuries all over the world and are used in shampoo formulations. These therapeutic plants can be utilized in extracts, powders, crudes, or derivatives. [1] .

#### *Ideal properties of Herbal Shampoo:*

1. Excessive sebum or other fatty substances, loose corneal cells, and dust or dirt should all be thoroughly and successfully removed from the hair.
2. It should generate a sufficient amount of foam to meet the user's psychological needs.
3. If you rinse it with water, it should come off easily.
4. It should leave the hair glossy, soft, and non-dry, with minimal flyaway and good manageability.
5. It ought to give the hair a pleasing scent.

6. It shouldn't irritate the skin or eyes or have other negative consequences.
7. The hand shouldn't get rough and chapped as a result. [2] .

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## Aim and Objectives :

### Aim:

To formulate and evaluate a herbal anti-dandruff shampoo using natural ingredients with antifungal, antibacterial, and scalp-soothing properties.

### Objectives:

- a) To identify and select herbal ingredients known for their anti-dandruff activity (e.g., neem, tea tree oil, aloe vera, tulsi, shikakai).
- b) To prepare a shampoo formulation incorporating these herbal extracts.
- c) To evaluate the physical and chemical properties (pH, viscosity, foamability, etc.) of the herbal shampoo.
- d) To evaluate the formulation's anti-dandruff effectiveness using clinical and microbiological studies.
- e) To assess the herbal shampoo's efficacy in comparison to commercially available anti-dandruff shampoos [3] .

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## Natural herb and their profile:

### 1.Shikakai:



**Fig1. Shikakai**

**Common Name:** Shikakai **Biological Name:** *Acacia*

*concinna* **Family:** Fabaceae

### Key Constituents:

Saponins, tannins, flavonoids, vitamins (A, C, D, E, K)

### Actions:

Antifungal, antimicrobial, anti-inflammatory, cleansing, conditioning

### Uses in Shampoo:

- Removes dandruff
- Soothes itchy scalp
- Cleanses gently without removing the natural oils
- Hair is strengthened and conditioned.

### Benefits of shikakai for hair :

1. Natural Cleanser: Saponins found in natural cleaners gently cleanse the scalp without removing its natural oils.
2. Anti-Dandruff: Has antifungal and antimicrobial properties that help reduce dandruff.

3. Promotes Hair Growth: Nourishes hair follicles and strengthens roots.
4. Prevents Hair Fall: lessens damage and strengthens the scalp.
5. Conditions Hair: Hair is conditioned with this natural conditioner, leaving hair soft and manageable.
6. Detangles Hair: Makes hair smoother and easier to comb.
7. Soothes Scalp: Reduces itchiness and irritation due to its anti-inflammatory action.
8. Delays Greying: Rich in antioxidants and vitamins that help maintain natural hair color [4]

## 2. *Neem*:



**Fig 2: Neem**

**Common Name:** Neem

**Biological Name:** *Azadirachta indica*

**Family:** Meliaceae

### Key Properties :

- Antibacterial
- Antifungal
- Anti-inflammatory
- Antiseptic

### Active Constituents:

- Nimbidin
- Azadirachtin
- Nimbin
- Quercetin

### Benefits of Neem for hair :

1. Encourages Hair development: Packed with antioxidants and vitamin C, which fortify hair follicles and accelerate development.
2. Prevents Premature Greying: Slows down the onset of greying by encouraging the production of melanin.
3. Treats Dandruff: Its anti-inflammatory and antibacterial properties help clear dandruff and soothe the scalp.
4. Conditions the Scalp: Neem oil deeply nourishes and moisturizes the scalp.
5. Controls Excess Oil: Regulates sebum production, keeping the scalp clean.
6. Fights Head Lice: Neem's insecticidal properties help eliminate lice naturally [5] .

### 3. Reetha:



**Fig 3: Reetha**

**Common name:** Soapnut or Soapberry.

**Biological name:** *Sapindus mukorossi* (commonly)

**Family:** Sapindaceae

**Biological source:** Dried fruit (pericarp) of *Sapindus mukorossi*

**Key property:** Contains saponins—natural surfactants with cleansing and foaming action

#### **Benefits of Reetha for hairs:**

1. Natural Cleanser: Reetha contains natural saponins that gently cleanse the scalp and hair without harsh chemicals.
2. Promotes Hair Growth: Improves blood circulation to the scalp and strengthens hair roots.
3. Prevents Dandruff: Its antifungal and antibacterial properties help reduce dandruff and scalp infections.
4. Adds Shine and Softness: Leaves hair smooth, shiny, and manageable.
5. Prevents Hair Fall: Nourishes the scalp, reducing hair breakage and fall.
6. Maintains Scalp pH: Helps maintain the natural pH balance of the scalp.
7. Eco-Friendly & Non-Toxic: A natural alternative to synthetic shampoos, safe for all hair types[6].

### 4. Amla:



**Fig 4: Amla**

**Common Name:** Amla, Indian Gooseberry

**Biological Name :** *Phyllanthus emblica* (also known as *Emblica officinalis*)

**Family:** Phyllanthaceae

**Biological Source:** Dried or fresh fruit of the plant

**Benefits of Amla for Hair:**

1. Encourages Hair development: Packed with antioxidants and vitamin C, which fortify hair follicles and accelerate development.
2. Prevents Premature Greying: Slows down the onset of greying by encouraging the production of melanin.
3. Cuts Down on Hair Loss: avoids breakage and fortifies roots with its high nutrient content.
4. Treats Dandruff: Its anti-inflammatory and antibacterial properties help clear dandruff and soothe the scalp.
5. Improves Hair Texture: Makes hair softer, shinier, and more manageable.
6. Conditions the Scalp: Nourishes and moisturizes the scalp to prevent dryness.
7. Enhances Natural Hair Color: Gives a natural dark tint when used regularly[7].

5. ***Aloe vera gel:***



**Fig 5: Aloe vera**

**Common Name:** Aloe vera

**Family:** *Asphodelaceae* (previously classified under *Liliaceae*)

**Biological Name :** Aloe vera (syn. Aloe barbadensis Miller)

**Biological Source:** Mucilaginous gel obtained from the leaves of the plant

**Benefits of Aloe Vera for Hair:**

1. Moisturizes Scalp and Hair: Aloe vera's natural enzymes hydrate and condition dry scalp and hair.
2. Reduces Dandruff: Its antifungal and anti-inflammatory properties help soothe irritation and reduce flaking.
3. Promotes Hair Growth: Contains vitamins and minerals that nourish hair follicles and stimulate growth.
4. Strengthens Hair: Rich in proteolytic enzymes that repair dead skin cells on the scalp and strengthen hair strands
5. Balances Scalp pH: Helps maintain the natural pH level of the scalp, preventing excess oiliness or dryness.
6. Reduces Itching and Inflammation: Calms irritated scalp and prevents scalp infections.
7. Adds Shine and Softness: Leaves hair smooth, shiny, and easier to manage[8].



## 6. Fenugreek:



Fig 6: Fenugreek

**Common Name:** Fenugreek

**Family:** Fabaceae (Leguminosae)

**Biological Name:** *Trigonella foenum-graecum*

**Biological Source:** Dried ripe seeds of the plant

### Benefits of Fenugreek for Hair:

1. Encourages Hair Growth: Packed with nicotinic acid and proteins, it promotes healthy hair development.
2. Reduces Hair Loss: Prevents breaking and strengthens hair roots.
3. Treats Dandruff: Its antifungal and moisturizing properties help combat dandruff and dry scalp.
4. Adds Shine and Softness: Conditions hair naturally, making it smooth and shiny.
5. Prevents Premature Greying: Contains antioxidants that help delay greying.
6. Soothes Scalp Irritation: Anti-inflammatory effects calm itching and redness.
7. Improves Hair Texture: Nourishes hair strands, reducing frizz and dryness.

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## MATERIALS AND METHODS

### Collection of Material

Shikakai powder, Reetha powder, Amla powder, Neem powder, Aloe vera gel were collected from local market.

### Weighing of Ingredients

All required herbal ingredients for shampoo preparation were accurately weighing individually by using digital balance [10].

### Preparation of Plant Extract

The drug is usually coarsely powdered, very fine powder being avoided.

- ✓ Moisten the drug in a suitable vessel, provided with a cover, with cold water.
- ✓ Allow to stand for 15 minutes.
- ✓ Then add boiling water, cover the vessel tightly.
- ✓ Allow it to stand for 30 minutes.

- ✓ Then strain the mixture, pass enough water to make the infusion.
- ✓ Some drugs are supplied in accurately weighed in muslin bags for preparing specific amounts of infusion.
- ✓ If the activity of the infusion is affected by the temperature of boiling water, cold water should be used.
- ✓ As the fresh infusions do not keep well, they should be made extemporaneously and in small quantities [11].

Take 2 gm of shikakai powder, amla powder, reetha powder,neem powder separately



Dissolve the powders in 20ml of distilled water



Boil for 10-15 minutes.



Filter it and collect the extract



**Fig 7: Boiling of herbs in solvent**



**Fig 8: Extract of herbs**

### Formulation of Anti-dandruff Shampoo

The antidandruff shampoo was created using the formula found in the provided table. A straight forward mixing procedure was used to create the shampoo. Extract of shikakai, Amla, Reetha, Neem and Fenugreek were mixed properly. To this extract remaining ingredient such as aloe vera gel, gelatin, lemon juice were added to improve aroma of formulation. Essential oils such as Rosemary oil, Lavender oil, Tea Tree oil were added [12-13].

**Table 1: Composition of Herbal Antidandruff Shampoo**

Sr. No.	Ingredients	Batch F1	Batch F2	Batch F3	Role
1.	Shikakai	1ml	0.5ml	1.5ml	Antidandruff
2.	Amla	1ml	1ml	1.5ml	To provide nourishment to hair
3.	Neem	1ml	1ml	1ml	Antibacterial Agent
4.	Reetha	1.5ml	1ml	1ml	Foaming agent/Antidandruff
5.	Fenugreek	1.5ml	1ml	1ml	Prevent hairfall/Antidandruff/Hair growth promoter
6.	Aloe vera gel	2ml	2ml	2ml	Conditioning agent
7.	Gelatin	4ml	4ml	4ml	Thickening agent
8.	SLS	1.5ml	1.5ml	1.5ml	Surfactant
9.	Essential oil	q.s (Rosemary oil)	q.s (Lavender oil)	q.s (Tea tree oil)	Perfume
10.	Lemon juice	2ml	2ml	2ml	Preservative /To adjust pH
11.	Purified water	Upto 20ml	Upto 20ml	Upto 20ml	Solvent



**Fig 9: Formulation of Antidandruff shampoo**

### EVALUATION OF HERBAL SHAMPOO :

The prepared formulation's solid content, physicochemical characterisation, pH, and organoleptic characteristics were all assessed.

#### a) Physical Characteristics

The shampoo's consistency, color, clarity, and visual appeal were evaluated.

#### b) Calculating pH

Using a pH paper, the pH of a shampoo solution in distilled water was measured at room temperature [11].

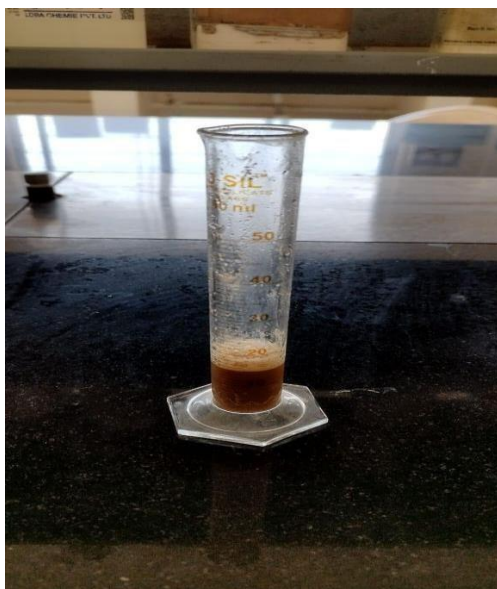
#### c) Calculating the fraction of solid materials



An evaporating dish that had been cleaned, dried, and weighed was filled with 4 grams of shampoo. To verify the precise weight of the shampoo, the dish and shampoo were weighed once more. The evaporating dish was placed on the hot plate to evaporate the shampoo's liquid component. After the shampoo was completely dried, the weight and, consequently, the percentage of its solid constituents that remained was determined.

**d) Test to assess foam stability and foaming capacity**

Using the cylinder shaking method, the foaming ability was assessed. In short, a 250 mL graduated cylinder was filled with 50 mL of the 1% commercial or designed shampoo solution, covered with one hand, and shaken ten times. Following a minute of shaking, the total amount of the foam content was noted. By measuring the foam volume following a one- and four-minute shake test, foam stability was assessed.



**Fig 10: Evaluation foaming ability**



**Fig 11: Percentage of solid content**

**e) Skin irritation test**

After applying the prepared herbal shampoo to the skin for five minutes, it was rinsed and examined for Irritation or inflammation on the skin [14].

**f) Measurement of Surface tension**

To establish 10% as the concentration, dilute the shampoo with distilled water. A stalagmometer was used for the measurements. Suck the stalagmometer's flattened end into the beaker with the generated shampoo sample until the level reaches the desired level. Allow the sample to progressively run from the mark after fixing that in the stand. When the liquid level moves from point A to point B, count the number of drops that form. Do the experiment once more with distilled water. The following equation was used to calculate the data

$R_2 =$

W1 is weight of empty beaker.

$(W_3 - W_1) N_1 \times R_1 (W_2 - W_1) N_2$

W2 is the beaker's weight containing distilled water.

W3 is the beaker's weight containing the shampoo solution.

N1 is the number of droplets of distilled water .

N2 is the number of shampoo solution drops .

R1 is the distilled water's room temperature surface tension.

R2 represents the shampoo solution's surface tension.[15]

**g) Wetting time**

A Surfactants wetting ability depends on its concentration and is commonly used to its effectiveness. The test is commonly performed to test the efficacy of the surfactant. The wetting time test was performed by measuring the time taken for the disc to sink in the shampoo solution [16].

## RESULTS AND DISCUSSION

In addition to the active phyto components, the synthetic antidandruff herbal shampoo is brimming with the benefits of natural herbs. It works as an antidandruff agent to gently nourish hair. The main underlying cause of dandruff, excessive oil on the scalp, is successfully eliminated by it. Amla provides additional nutrients and antioxidants to support healthy hair and guard against dandruff-causing free radical damage to hair follicles. Amla's antibacterial, anti-inflammatory, and vitamin C qualities can prevent the development of dandruff. The anti-bacterial property of neem do wonders in fighting dandruff.

**Table 2: Evaluation test of Anti-dandruff Shampoo**

Sr. No.	Parameter	F1	F2	F3
1.	Appearance	Liquid in nature	Liquid in nature	Liquid in nature
2.	Color	Golden Yellow	Lemon Yellow	Light Yellow
3.	Transparency	Non transparent	Non transparent	Non transparent
4.	Consistency	Smooth	Smooth	Smooth
5.	pH	6.4	6.2	7
6.	Percentage of solid content	23.45	22.0	22.60
7.	Foam Stability	1.2 min	1 min	1 min
8.	Skin irritation test	Non irritant	Non irritant	Non irritant
9.	Surface Tension	34.18	33.09	32.12
10.	Wetting time	13 sec	12 sec`	10 sec

## CONCLUSION

A herbal hair pack is a very gentle and moderate way to cure hair dandruff. The cosmetics made from herbs are renowned for being non-toxic. Both the scalp's It nourishes the skin and hair. It treats dandruff by removing excess oil from the scalp. Hair that is rich, healthy, and problem-free is the consequence of regular usage of this pack. The filthy environment of an oily scalp is the cause of hair dandruff.

This study demonstrated the herbal hair pack's efficacious properties, however further investigation is required to ascertain the additional advantages this hair pack may offer. Because they are less harmful and have fewer negative effects, natural medicines are used extensively nowadays. According to the current study, in order to create a stable and effective herbal shampoo without synthetic chemicals.

The following prepared herbal shampoo reduces hair fall, promotes hair growth and acts as anti-dandruff. Formulated herbal shampoo contains SLS (Synthetic chemical) But its percentage is less compared to marketed synthetic shampoo. For In order to achieve efficient conditioning effects, the produced composition uses plant extracts such as Amla, Reetha, Shikakai, Neem, Fenugreek, and aloe vera in place of other synthetic agents.

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