

## FORMULATION AND EVALUATION OF A POLYHERBAL ANTI-DANDRUFF SHAMPOO: A NATURAL APPROACH TO SCALP CARE

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### **ABSTRACT**

Dandruff is a common scalp condition causing itching and discomfort, often treated with chemical-based shampoos that may have side effects. This study formulates and evaluates a polyherbal anti-dandruff shampoo using natural extracts of leaves of Guava, Curry plant, Moringa, Lantana camara, and Eucalyptus leaves, known for their antimicrobial and scalp-nourishing properties. The shampoo demonstrated effective cleansing, foam stability, and antifungal activity against *Candida albicans* without causing irritation. The results suggest it as a safe, natural alternative to synthetic shampoos for dandruff treatment.

**Keywords:** Polyherbal shampoo, Dandruff, Herbal extracts, Antifungal activity, Scalp health.

### **INTRODUCTION**

Hair plays a significant role in human appearance and identity, serving both protective and aesthetic functions. It is composed primarily of keratin and grows from follicles embedded in the scalp. Hair health is influenced by genetics, nutrition, environmental factors, and proper care. Maintaining scalp hygiene is crucial to prevent common hair-related issues, including dandruff.

Dandruff is a widespread scalp condition characterized by excessive shedding of dead skin cells, leading to visible flakes, itching, and irritation. It is commonly associated with an overgrowth of the fungus *Malassezia*, excessive oil production, dry scalp, or underlying skin conditions. Other contributing factors include stress, hormonal changes, and the use of harsh hair products.

Traditional anti-dandruff treatments often involve medicated shampoos containing synthetic antifungal and anti-inflammatory agents. However, prolonged use of chemical-based products may cause scalp irritation or other side effects. As a result, there is growing interest in herbal

formulations that utilize natural plant extracts with antimicrobial, antifungal, and soothing properties. These herbal alternatives offer a safer and more sustainable approach to dandruff management while promoting overall scalp health.






Marketed (Synthetic) available shampoo contains artificial ingredients that are bad for the skin, damages hair follicles, irritates the scalp and some negative effects. Because consumers are now aware of the negative effects that synthetic products can have on their skin, hair, and eyes, they choose herbal products over synthetic ones. Herbal Shampoo is the cosmetic preparation using herbs and the purpose of these hair care products is to eliminate excess oil, dirt, and dandruff from the scalp and hair.

The main aim of our present study is to formulate and evaluate the polyherbal antidandruff shampoo by using various natural sources. The herbs used in the process of preparation shampoo are *Murray Koenigii* (curry leaves), *Moringa Oleifera* (Drumstick leaves), *Psidium Guajava* (Guava leaves), *Eucalyptus Globules* (*Eucalyptus* leaves), and *Lantana Camara* leaves.

## MATERIALS AND METHOIDS

**Materials:** The materials required in the formulation of polyherbal antidandruff shampoo are mentioned in the below table.

**Table no 1:** List of herbs used in polyherbal antidandruff shampoo

S.NO	NAME OF HERB	USES	IMAGE
1.	<i>Murray Koenigii</i> (Curry leaves)	Strengthens hair roots, promotes hair growth	
2.	<i>Moringa oleifera</i> (Drumstick)	prevents premature greying, improves scalp condition, detoxifying the scalp	
3.	<i>Psidium guajava</i> (guava)	enhances hair texture, reduces scalp inflammation	
4.	<i>Eucalyptus globulus</i>	Fights dandruff, reduces excess oil on scalp	
5.	<i>Lantana camara</i>	Fights dandruff, reduces inflammation, strengthens hair roots	

Other ingredients which are used are given below.

**Table no 2:** List of ingredients used in the formulation of polyherbal antidandruff shampoo

S.NO	MATERIAL USED	QUANTITY
1.	SLS	10ml
2.	Glycerin	1.5ml
3.	Methyl paraben	0.1gm
4.	Citric acid	0.25gm
5.	Lavender oil	Qs
6.	Purified water	Qs till 50ml

## METHODOLOGY

### Collections of herbs:

The herbs were collected from the herbal garden of Gokaraju Rangaraju College of Pharmacy. They are dried under shade, coarsely powdered and then passed through sieve no. 120 and the fine powder was used in extraction process.

The powders were extracted using methods like Soxhlet extraction and Decoction method.

### EXTRACTION OF LANTANA CAMARA

Fresh leaves of lantana camara was collected and it is thoroughly washed with distilled water. After shade drying the leaves for 3-4 days, 30 grams of lantana leaf powder was taken and 300ml of methanol was taken in a Soxhlet apparatus. The powder sample was extracted at 78.5°C for 7hrs and the extract solution was stored at 4°C until further procedure takes place.



**Fig no 1:** Soxhlet extraction method of lantana camara leaves

### EXTRACTION OF OTHER HERBS (Guava leaves, curry leaves, eucalyptus leaves and moringa leaves):

The composition was made by simple decoction process. The leaves of guava, moringa, curry leaves and eucalyptus were collected and given a thorough wash. After shade drying the leaves and powdered coarsely and fine powder was passed through sieve number.120 accurately

weighed and separately mixed with 100ml of distilled water and kept for boiling till water gets reduced to one quarter.

After boiling, the extract was cooled at normal room temperature and then filtered with muslin cloth to get the final filtrate.

## **FORMULATION AND EVALUATION OF POLYHERBL ANTI-DANDRUFF SHAMPOO**

### **Preparation of Shampoo Base:**

1g Acacia was mixed with purified water and triturated. SLS(Surfactant) and Glycerin (Moisturizer) were added and stirred well to prepare a base.

### **Addition of Herbal Extracts:**

Herbal extracts from Guava, Eucalyptus, Moringa, Curry, and Lantana leaves were added to the shampoo base while stirring.

### **Final Processing:**

2 drops of Lavender Oil was added for fragrance. Methyl Paraben included as a preservative. pH adjusted to the ideal range (5.5-6.0) using Citric Acid.

## **EVALUATION PARAMETERS**

### **1. Physical appearance/ visual inspection**

Physical evaluation tests help assess the appearance, texture, consistency and stability of the shampoo formulation. These tests ensure that the product is visually appealing, easy to use and maintains its properties over time.

### **2. Determination of pH**

The pH of the 10ml formulated shampoo solution in distilled water was measured by using pH meter at room temperature  $25\pm 2^{\circ}\text{C}$  calibrated using standard buffer solution and pH readings were obtained and recorded.[21]

### **3. Dirt dispersion**

Two drops of shampoo were added to 10 mL of distilled water taken in a large test tube. To this solution, one drop of India ink was added and the test tube was stoppered and shaken ten times. The amount of ink in the foam was indicated by the rubric such as None, Light, Moderate or Heavy.

### **4. Foam ability and foam stability**

Foaming ability and foam stability. Foaming ability was determined by using cylinder shake method. Briefly, 50 ml of the 1% commercial or formulated shampoo solution was placed into a 250 mL graduated cylinder; it was covered with one hand and shaken 10 times. The total

volume of the foam content after 1 min of shaking was recorded. Foam stability was evaluated by recording the foam volume after 1 min and 4 min of shake test. [11]

### 5. Surface tension measurement

The surface tension of 10% w/v shampoo in distilled water was measured using stalagmometer at room temperature.

### 6. Determination of % of solid contents

4 gms of shampoo were placed in a previously clean, dry and weighed evaporating dish. The dish and shampoo were weighed again to confirm the exact weight of the shampoo. The liquid portion of the shampoo was evaporated by placing the evaporating dish on the hot plate. The weight and thus % of the solid contents of shampoo left after complete drying was calculated.

### 7. Wetting time test

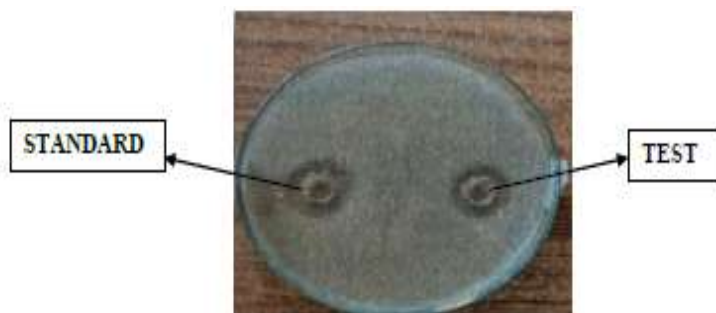
A canvas paper was cut into 1-inch diameter discs having an average weight of 0.44 g. The smooth surface of disc was placed on the surface of 1% v/v shampoo solution and the stopwatch started. The time required for the disc to begin to sink was noted down as the wetting time.

### 8. Washability

The washability of the shampoo was known by applying the shampoo onto the hands and then washing them with running water to observe the ease of removal of shampoo.

### 9. Antifungal testing

Well diffusion assay method was used for checking antidandruff activity of the formulation of polyherbal antidandruff shampoo. The examination was done against *Candida albicans* using an agar well diffusion method. The microbial cell suspension was spread onto the Sabouraud Dextrose Agar (SDA) plates and wells were made by using sterilized stainless-steel corn borer. The wells were loaded with the polyherbal antidandruff shampoo. The plates were incubated at  $35 \pm 2$  °C for 48 hours. After the said time, plates were examined for the zone of inhibition around the well. The diameter of the inhibition zones was measured manually by using the ruler.



**Fig no 2:** Antifungal evaluation against *C. Albicans* using well diffusion

## RESULTS

**1. Physical appearance/visual inspection:**

Physical evaluation was performed for the prepared formulation by visual means. The shampoo was observed to be dark greenish brown colour and having strong odour but a stable fragrance due to the presence of guava, eucalyptus, curry leaves, moringa and lantana extracts with a good foaming ability.

**2. pH:**

The pH of the prepared formulation of shampoo using distilled water (10ml) was evaluated at 25°C temperature. For enhancing and improving hair quality the pH of the shampoo should ideally be in the range of 5.5- 6.5.

**3. Dirt dispersion:**

A shampoo that causes ink to accumulate in the foam is considered low quality, as the dirt should remain in the water. If dirt remains in the foam, it may be difficult to rinse off and could redeposit onto the hair. In this evaluation, only a small amount of ink was observed in the foam, indicating that the prepared formulation is effective and satisfactory.

**Table no 3:** % solid content and dirt dispersion

% Solid content	Dirt dispersion
21%	Moderate

**4. Foaming ability and foaming stability**

The foaming ability was evaluated using the cylinder shake method. While foam production is not directly linked to a shampoo's cleansing effectiveness, it is an important factor for consumer preference. The formulation generated stable foam with minimal changes in foam volume.

**Table no 4:** Foam ability and Foam stability

Foam volume after 1 minute (ml)	Foam volume after 4 minutes (ml)
44	39

**5. Surface tension:** The surface tension of a shampoo indicates the concentration of surfactants present. A lower surface tension is associated with higher-quality shampoo and enhanced cleansing ability. The surface tension of a **10% v/v shampoo solution** was measured at room temperature using a stalagmometer.

**Surface tension of sample= (density of liquid/ density of water)\*(no. of drops of water/ no. of drops of liquid)\* surface tension of water**

**Table no 5:** Test for surface tension

No of drops of water	No of drops of liquid	Density	Surface tension(dynes/cm)
64	125	1.132g/ml	36.365

**6. Washability test:**

The shampoo exhibits excellent rinse-off properties, allowing it to be easily washed out with minimal water and effort.

**7. Wetting time:**

The wetting ability of a surfactant depends on its concentration and is commonly used to assess its effectiveness. The canvas disc method is a fast, efficient, and reliable test for evaluating a shampoo's wetting ability. The wetting time of the herbal shampoo was recorded at **50–70 seconds**, indicating good performance.

**8. Percentage of solid content:**

An excessive number of solids in the shampoo can make it difficult to apply and rinse out. To assess the solid content, approximately 4 grams of shampoo was heated on a hot plate until completely dry. The remaining residue was then weighed, and its percentage was determined. The results of percent of solid content were found to be 15.6%.

**9. Antifungal testing:**

After incubation, it was observed that the shampoo showed comparable zone of inhibition when compared to the standard shampoo (Selsun shampoo). A zone of inhibition is a clear area around a substance that inhibits the growth of fungus. Later on, zone of inhibition of shampoo was measured in mm by a ruler for well-exhibiting inhibition zone under and around well.

**Table 5:** Antifungal testing against *Candida Albicans*

Formulation Used	Zone of inhibition against <i>Candida albicans</i> (mm)
Test	16.4±0.05mm
Standard	17.6mm

**CONCLUSION**

The study highlights the importance of effective dandruff management and the potential of herbal formulations as a safer alternative to synthetic treatments. The formulated polyherbal anti-dandruff shampoo, containing extracts from Guava leaves, Curry leaves, Moringa, Lantana, and Eucalyptus leaves, demonstrated significant antifungal activity, cleansing

efficiency, and scalp nourishment. The results suggest that herbal ingredients can effectively combat dandruff while minimizing side effects associated with chemical-based shampoos. The prepared shampoo was assessed for its physicochemical properties, including pH, foam stability, cleansing ability, and antifungal activity. The results indicated that the shampoo exhibited excellent cleansing action, stable foaming, and significant antifungal effects against *Candida albicans*, the primary causative agent of dandruff.

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