

## Formulation and evaluation of Herbal Anti dandruff shampoo

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### ABSTRACT

The aim of the present study is to formulate and evaluate herbal Anti dandruff shampoo containing natural ingredients with an emphasis on safety and efficacy. It clears dirt, dandruff, promotes hair growth, luster, strengthens and darkens the hair. The shampoo sector is probably the largest unit of among the hair care products. Since the shampoos are one of the cosmetic product used in daily as the hair is special and cherished feature of humans. The main objective is to study how to eliminate harmful synthetic ingredients from anti-dandruff shampoo formulation and substitute them with safe natural ingredients. Several physicochemical tests were performed for visual assessment, wetting time, pH, assurance of solid contents, surface tension, detergency, dirt dispersion, conditioning performance, foam stability.

**KEYWORDS** : pH,Herbal shampoo, Natural ingredients, Hair,Dandruff, Cleansing action,

### I. INTRODUCTION

#### Hair

The essential component of human beauty is hair. A protein filament known as hair grows from follicles in the skin's dermis. Hair is known scientifically as pili or pilus. The existence of hair is one of the main characteristics that distinguishes mammals as a distinct class of species. Hair is a component of the integumentary system and extends downward into the dermal layer where it resides in the hair follicle. It has a sensory role, shields from cold and UV radiation, and can have a profound psychological impact when its growth or form is abnormal. In humans, it is a prized and highly visible signal of health, youth, and even class.

#### Hair anatomy

- Hair follicles located in the fatty layer of the scalp are where hair grows. Contrary to

popular assumption, hair follicles actually grow in groups of 1-4 hairs known as "follicular units," as opposed to single strands.

- Each hair follicle has a hair bulb at the base, which houses the machinery for growing new hair.
- The blood arteries in the dermis provide nutrients for hair follicles. To create the hair shaft, cells divide and grow.
- The hair retains a delicate form while it is still growing beneath the epidermis. The outer layer of after it pushes through the epidermis hardens into keratin.

#### Dandruff

Dandruff is a common scalp condition that is indicated by the presence of corneocytes, which form clusters due to their strong cohesive power, and appears as flaky, white to yellowish scales that itch. While sebaceous glands are most active, which is between puberty and middle age, dandruff has been found to mostly occur during this time. It is characterized by the shedding of dead skin cells from the scalp, which often results in visible flakes on the scalp, hair, and shoulders. These flakes can be white or yellowish in colour and are usually accompanied by symptoms such as itching, flaking, redness, and scalp irritation.

#### Causes

The exact cause of dandruff is not fully understood, but it is believed to involve a combination of genetic, hormonal, environmental, and microbial factors. One of the main contributing factors to dandruff is an overgrowth of a naturally occurring fungus called *Malassezia*, which is found on the scalp of most individuals. When this fungus grows excessively, it can lead to an accelerated rate of skin cell turnover, causing dead skin cells to accumulate and form visible flakes. Other factors that can contribute to dandruff include dry scalp,

oily scalp, skin conditions like seborrheic dermatitis (a type of eczema that affects the scalp), sensitivity to hair care products, and other underlying medical conditions such as psoriasis or immune system disorders.

The cause of dandruff varies among individuals, depending on their susceptibility.

Causes can be classified into-

- a) Microbial
- b) Non-microbial.

### Microbial factors

#### 1. Fungal:

Malassezia furfur is thought to be the main contributor of dandruff. Malassezia, a fungus, can cause dandruff through one or both of the following mechanisms: On the scalp, malassezia activates the Lipase enzyme. The enzyme causes the oxidation of the sebum's triglycerides to yield saturated and unsaturated fatty acids. The fungi use saturated fatty acids for growth and self-propagation. Oleic acid and arachidonic acid are examples of unsaturated fatty acids. Malassezia alters how the enzymes work and prevents the severing of the links. This causes corneocytes to group together and shed off in masses, leaving behind noticeable white flakes.

#### 2. Bacterial :

Bacterial imbalance between the two major bacterial communities present on the scalp

- Staphylococcus epidermidis
- Propionibacterium acnes.

### Non-microbial Factors:

1. Damage to the scalp Stratum corneum
2. Individual susceptibility to Oleic acid.
3. Dry scalp.
4. Oily or irritated skin.
5. Dirt accumulation due to less frequent shampooing.
6. Sensitivity to hair cosmetics.

7. Other scalp conditions like psoriasis, eczema, etc.

### Shampoo

Simply put, shampoo is a hair care treatment used to clean both the skin and hairs on the scalp. The word "shampoo" actually originated in India, where it was used to describe cleaning by massaging the skin and hair. The Hindi word "champoo" means to press or massage. Drene, the first shampoo to use synthetic surfactants in place of soap, was what gave rise to modern shampoo as we know it today. They were initially used for cleaning carpets, cars, and laundry, but eventually developed into hair shampoo.

### Anti dandruff shampoo

Antidandruff shampoo is a hair care product designed to reduce and eliminate dandruff, a common scalp condition that causes flaky, itchy skin. Antidandruff shampoos may also contain moisturizing and soothing ingredients to help alleviate scalp irritation and improve the overall health of the scalp and hair. They are available over-the-counter or by prescription

### Material and method

#### Orange peel

Orange peel may have some potential benefits for reducing dandruff due to its anti-inflammatory and antimicrobial properties. Dandruff is often caused by an overgrowth of yeast on the scalp, which can lead to inflammation and flaking. The anti-inflammatory compounds in orange peel may help to reduce inflammation and soothe the scalp, while the antimicrobial properties may help to inhibit the growth of yeast and other microorganisms on the scalp.

Antimicrobial properties may help to inhibit the growth of yeast and other microorganisms on the scalp.



Fig 1 Orange peel

### Reetha

Reetha is believed to have anti-dandruff properties due to its ability to cleanse and soothe the scalp. Dandruff is a common scalp condition that can be caused by a variety of factors, including fungal infections, dry scalp, and an overproduction of oil.

### Hibiscus

Hibiscus may have anti-dandruff properties due to its ability to promote scalp health and reduce scalp irritation. Dandruff is a common scalp condition that can be caused by a variety of factors, including fungal infections, dry scalp, and an overproduction of oil.

### Ginger

Ginger may have some potential benefits in reducing dandruff due to its anti-inflammatory and anti-microbial properties. Dandruff is often caused by an overgrowth of yeast on the scalp, which can lead to inflammation and flaking. The anti-inflammatory compounds in ginger may help to reduce inflammation and soothe the scalp, while the anti-microbial properties may help to inhibit the growth of yeast and other microorganisms on the scalp.

### Curry leaves

Curry leaves are known for their numerous health benefits, including their anti-inflammatory, antioxidant, and antimicrobial properties. These properties may help to reduce dandruff and promote a healthy scalp.

### Aloe vera

Aloe vera can help alleviate dandruff symptoms in several ways. Firstly, it helps to soothe the scalp and reduce inflammation, which can help to alleviate the itching and discomfort associated with dandruff. Secondly, it has natural anti-fungal properties that can help to eliminate the fungi that may be causing dandruff. Thirdly, aloe vera helps to moisturize the scalp, which can help to reduce dryness and flakiness.

### Collection of plants:

The parts of plants like orange (peel), Reetha (fruit), Ginger (root) and Guar gum were collected from the local market. Curry patta (leaves) and Aloe vera (leaves) were obtained from nursery locally.

These were washed under running water to remove contaminants.

They are dried in sunlight, converted into coarse powders and sieved using 60meshes.

The extracts were prepared by decoction method and the prepared extracts were stored in well-closed containers.

### Preparation of herbal extract:

5g of Curry patta powder, 5g of Ginger water, 10g of Aloe vera gel, 20g of Reetha and 5g of orange peel powder were mixed with 100 ml water in a stainless-steel vessel. The mixture was kept for boiling until the water reduced to one quarter. It was then filtered. The clear extract obtained was used as herbal extract.

Plant	Part	Quantity for 50 mg
Curry leaves	leaves	2.5%
Ginger	root	2.5%
Orange peel powder	peel	10%
Reetha	fruit	5%
Hibiscus	leaves	2.5%
Aloe vera	leaves	5%

Table 1 - List of Herbal extract

### Preparation of formulation

- To increase the thickness of formulation, SLS (7.5%) solution was prepared using 0.1 M NaCl.
- Twenty ml of the herbal extract was added to 20 ml SLS solution with 20 ml NaCl solution and mixed by shaking gently.

- The final volume was made to 100 ml by adding 10 ml acacia gum extract, 2 ml of glycerine and 25 ml of water.
- To improve aroma in the formulation, sufficient quantity (q.s.) of essential oil (castor oil) was added. The shampoo also included one capsule of Vitamin E for conditioning, activated charcoal for colour.

S NO	Ingredients	Quantity(ml)
1	Herbal extract	20
2	Sls	20
3	0.1 M NaCl	20
4	Acacia	10
5	Glycerine	2
6	Vitamin e capsules	2
7	Lemon juice	2
8	Essential oil(castor oil )	q.s
9	Water	25

Table 2 – Formulation of anti dandruff shampoo

**Evaluation of shampoo formulation**

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

Developed formulation was evaluated for their clarity, color and odour. All evaluations were reported and discussed

**b. Determination of pH:** Developed formulation was diluted using distilled water to prepare a sample with 10 % concentration. The prepared sample was checked for pH using a digital pH meter at room temperature 30±2°C

**c. Determination of percentage solids contents:**

A clean dry china dish was weighed and added with 4 grams of shampoo. The dish with shampoo was weighed. The exact weight of the shampoo was calculated. The china dish with shampoo was placed on the hot plate until the liquid portion was evaporated. The weight after drying was calculated

**d. Measurement of viscosity:** The viscosity of the shampoo was determined by using Brookfield Viscometer LVDV Prime-I. The viscosity of shampoo was measured at room temperature i.e. 30±2°C with varying rpm and torque.

**e. Surface tension measurement:** Dilute the shampoo using distilled water to fix 10% as concentration. Measurements were carried out using stalagmometer. Dip the flattened end of stalagmometer in to beaker containing sample of developed shampoo and suck it until the level reaches the mark. Fix that in the stand and allow the sample to run slowly from the mark. Count the number of drops formed when level of liquid

reaches from A to B. Repeat the experiment with distilled water. The data was calculated using following equation.

$$R2 = \frac{(W3-W1)N}{(W2-W1)N2} * R1$$

W1 is weight of empty beaker.

W2 is weight of beaker with distilled water

W3 is Weight of beaker with shampoo solution.

N1 is no. of drops of distilled water.

N2 is no. of drops of shampoo solution.

R1 is surface tension of distilled water at room temperature.

R2 is surface tension of shampoo solution

**f. Cleaning action:** 5 grams of wool yarn was added in grease and it was placed in flask containing 200 ml of water with 1 gram of shampoo. Temperature of content in the flask was maintained at 30±2°C. flask was shaken for 4 minutes at the rate of 50 shakes per minute. The solution was removed and sample was taken out, dried and weighed. The amount of grease removed was calculated by using the following equation.

In which,

DP= percentage of detergency power

C= weight of sebum in the control sample

T= weight of sebum in the test sample

**g. Foaming ability and foam stability:** Cylinder shake method with slight modification was used for determining foaming ability. 50ml of the 1%

shampoo solution was put into a 250 ml graduated measuring cylinder and covered with hand. Measuring cylinder was shaken for 1 minute. The total volume of the foam contents after 1 minute shaking was recorded. The procedure was continued for 5 minutes .

## II. CONCLUSION

In conclusion, dandruff is a common scalp condition characterized by the shedding of dead skin cells from the scalp, often resulting in visible flakes and associated symptoms. It can be caused by various factors, and treatment depends on the underlying cause and severity of the condition. With proper care and management, most cases of dandruff can be effectively controlled.

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