

## Formulation and Evaluation of Herbal Hair Shampoo, Mask and Serum

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### ABSTRACT

A vital component of the body is hair. It is a measure of health. A hair mask can help keep our hair hydrated. They are particularly helpful for damaged or dry hair. A hair mask, hair shampoo could make our hair stronger. The most vital organ in the mammalian system, the hair follicle determines appearance, distinguishes gender, protects against extreme heat, and aids in self-defence. Younger generations have started to face significant challenges with hair loss as a result of numerous lifestyle-related changes, including exhaustion, worry, junk food consumption, and the use of various hairstyling colouring techniques. The natural ingredients in the herbs provide the body with nutrients and other beneficial minerals without having any negative effects. Chrysanthemum flowers are used for the preparation of hair conditioning agents. Because chrysanthemum flowers have so many health advantages for the scalp and hair, they make excellent hair masks, shampoos, and serums. They contain vitamins and minerals; chrysanthemum blossoms can be used as a natural conditioner to treat dandruff and even encourage hair development. chrysanthemum flowers provide a number of advantages that immediately enhance the health, look, and feel of hair, we utilize them in hair treatments, shampoos, and serums. Chrysanthemum's antibacterial and anti-inflammatory qualities help to reduce dandruff and soothe irritated scalps. By reducing inflammation, irritation, and dryness or flakiness, it helps keep the scalp healthy when added to shampoos or serums. Chrysanthemum is a natural component that is generally mild and appropriate for a range of hair types, including those with sensitive scalps. It is a safe option for those who have allergies or who prefer natural alternatives because it is less likely to irritate skin or trigger allergic reactions. Hair shampoos, hair masks and hair serum are common herbal

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hair care products.

**Keywords:** Herbal hair mask, hair shampoo, hair serum, flax seed, herbs, rice flour, coconut oil, aloe vera, olive oil.

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## I. INTRODUCTION

Preparations designed to cleanse, change the texture, change the colour, revitalize stressed hair, nourish hair, and give hair a healthy appearance are all considered hair cosmetics. Hair types vary from person to person and include dry hair, greasy hair, as well as normal hair. Nowadays, people don't have time to think about how they look. problems relating to hair, such as split ends, dandruff, white hair, hair loss, etc. Hair issues are brought on by stress, infections of the scalp, hormone imbalances, inadequate consumption of vitamins, food, and minerals, and overuse of chemical shampoos [1–2]. Products that are used for cleaning, texture modification, color change, revitalizing stressed hair, nourishing hair, and giving hair a healthy appearance are referred to as hair care products. Dandruff is a significant and prevalent issue these days that is brought on by these products used in daily life. The main purposes of hair care formulas are to enhance the physical characteristics of the hair Fiber, including its strength, and texture. The enhancement of sensory qualities like brightness, frizz reduction, and hair film development are the secondary purposes [3]. It has cultural and aesthetic value in addition to being crucial in protecting the scalp from the elements such the sun and cold. These days, maintaining a clean scalp and hair is one of the most important parts of one's personal life. The hair is the most important part of the body. We therefore created a hair mask, hair shampoo and hair serum formula, to take care of them. The advantages of the herbal hair mask's ingredients for Hair are well-known.

Vitamin E, coconut oils are also included in the hair mask, hair serum and shampoo and are applied to the hair. These herbal hair products are made without the use of any chemicals. Since it only contains natural ingredients, it doesn't harm your hair. Hair is a sign of excellent health and a sensitive organ. We might use an herbal hair mask to help hydrate our hair. They are extremely beneficial for dry and damaged hair. Adopting a healthy lifestyle and selecting products containing these elements support the general health of hair [4]. Our scalp's health and the strength of our hair can both be enhanced by a hair mask. These hair products are made at home, are very beneficial, and have no side effects. Many materials can be used to create these products. These products are very beneficial for persons whose hair is severely damaged or extremely thin. Our personalities are more attractive when we have nice hair. Although there are many different types of masks available, many of them contain chemicals. Thus, we produced a product using herbs. The process of creating hair mask, shampoo and serum is very easy. Herbs are widely used as therapeutic agents due to their affordability, accessibility, and safety. The global market is seeing an increase in demand for herbal formulations. The main objective of our study was to fully resolve this difficulty. For hair care, we therefore developed a multifunctional herbal anti-dandruff, conditioning, and anti-hair fall mask [5]. A natural and calming treatment with many advantages for the hair and scalp is an herbal hair serum, hair mask, hair shampoo prepared from chrysanthemum blossoms. Chrysanthemum flowers have been utilized in traditional medicine due to their potent anti-

inflammatory and antioxidant qualities. These flowers support healthy hair growth, strengthen and nourish hair strands, and enhance scalp health when applied topically. Due to the use of heat or chemical products, dandruff has become a common problem [6]. These hair products make the hair appear more vivid and glossy by balancing oil production, decreasing dandruff, and increasing shine. Due to their safe and efficient energetic principles, medicinal and aromatic flowers have attracted interest from people all over the world.

### Objective

- To prepare herbal hair shampoo, hair mask serum from natural powdered ingredients.
- Herbal shampoo, herbal hair mask and serum are made of natural ingredients that is good for all type of skin so there is no need to worry about allergic reaction of skin.
- For our hair to be strong, healthy, and beautiful, our scalps must maintain the ideal ratio of pH to oil. To achieve the ideal oil balance, use herbal shampoos, serum and hair mask.

### Benefits of Herbal shampoo, hair mask and serum

1. Promote hair growth
2. Less hair loss
3. Reduce dandruff
4. More shine and long-lasting colour
5. Silky hairs

### Related problem of Hair

Dandruff, Heat damage, Colour damage, grey hair, Oily hair, Freezy hair, thin hair, White hair, Split ends.

### Herbal Ingredients

There are many plant parts that have been shown to have hair care properties were chosen for investigation. The ingredients that we used to formulate the hair mask; shampoo as shown in Table 1.

**Table 1: Ingredients for herbal hair mask and shampoo and serum**

Herbal Shampoo	Herbal hair Mask	Hair serum
Chrysanthemum powder	Chrysanthemum powder	Chrysanthemum powder
Rosemary leaves	Flax seeds	Rosemary leaves
Banyan roots	Coconut oil	Olive oil
Sodium Lauryl sulfate	Rice flour, Vitamin E	Vitamin E
Glycerin	Glycerin	Glycerin
Aloe vera gel	Aloe vera gel	Aloe vera gel
Sodium Benzoate	Sodium benzoate	Sodium benzoate
Water	Water	Water
Lavender oil	Lavender oil	Rosemary water

- **Chrysanthemum flower (for mask, shampoo, serum)**

### Constituents and uses of Chrysanthemum

In addition to being used for many other functions, chrysanthemum flowers are well-known for their lovely appearance. Chrysanthemum's anti-inflammatory and antioxidant qualities support a healthier environment for hair growth, lessen dandruff, and nourish the scalp. When applied to the scalp, chrysanthemum oil can promote blood flow, energize hair follicles, and stop hair loss.

**Constituents:** Flavonoids, Essential oils, Phenolic compounds, Tannins, Vitamins C and minerals.

- **Flax Seeds (for hair mask)**

Flaxseed, sometimes referred to as linseed, has medicinal qualities that help with diseases affecting the scalp and damaged hair [7,8,9]. Flaxseed mask is a popular option in hair care since it moisturizes the scalp and encourages hair development. the field of herbal makeup [10, 11].

### Constituents and uses:

Flax seed contains between 20 and 30 percent protein. Flax seed is rich in nutrients and offers numerous health and hair benefits because it is composed of:

Proteins, Fibres, Vitamin E, Vitamin B, Magnesium, Antioxidants, Omega-3-fatty acid, Selenium, Manganese.

Flax seeds are a rich source of vitamins, minerals, and good fats that may aid with:

- Promote hair growth
- Prevent hair loss
- Provide hair smoothness

By feeding the hair follicles, flax seed gel promotes longer and faster hair growth. Flaxseeds' vitamin E content nourishes the scalp and lessens damage from free radicals. [10,11].

#### • Coconut oil (for hair mask)

Both natural and synthetic substances make up hair oils [12].

It is advised to blend coconut oil with herbal drugs for the best hair development [13]. In addition to promoting hair growth (length), coconut oil also protects the hair from sun damage, adds gloss and luster, and combats dryness, dandruff, scalp infections, and fungus [14].

#### Constituents and Uses

About 95% of the oil is made up of saturated fatty acids, which have eight to ten carbon atoms. It is beneficial for your scalp and moisturizes your hair. It also gives good fat, keeps you hydrated, enhances the health of your skin, and fights bacteria [14].

#### • Rice flour (for mask)

By using either the soaked, boiled or fermented rice water for hair, you can repair and strengthen damaged hair shaft while providing shine, elasticity and smoothness to the hair. There are a couple of ways to use rice water for hair as a rinse [15].

#### Constituents

Carbohydrates, Proteins, Vitamins

#### Uses

When applied to homemade hair masks or conditioners, it helps soften hair. It can be applied as part of a scalp treatment to help calm and lessen dandruff and aids in removing extra oil and revitalizing your hair without the need for washing [15].

### Vitamin E capsule (for mask and serum)

#### Uses

Vitamin E helps lessen hair loss and encourage better hair development by fortifying hair follicles and enhancing scalp circulation. As an antioxidant, vitamin E oil has been shown to hydrate hair, enhance capillary size, which increases blood flow to the scalp, and prevent premature aging [16].

## II. MATERIALS AND METHODS

### Herbal hair mask

The herbs used to make herbal hair products contain antibacterial, anti-inflammatory, and antioxidant qualities. The chrysanthemum flower was selected to make the herbal hair mask. Flax seeds, aloe Vera gel, chrysanthemum powder, glycerine, coconut oil, vitamin E oil, and rice flour, olive oil were among the natural ingredients used to construct the hair serum, shampoo and hair mask. The components must be collected, cleaned, dried, powdered, weighed, and mixed with oils and preservatives before being sealed in an airtight container. This study presents the findings of an evaluation of the herbal hair mask formulation that took into account a number of parameters, such as pH, wash ability, the type of hair after washing, patch test, and so on.

**Table 2: Ingredients used for the preparation of herbal hair mask**

Herbal hair Mask	Quantity
Chrysanthemum powder	2g
Flax seeds	5g
Coconut oil	5ml
Rice flour, Vitamin E	5g, 1.5ml
Glycerin	5ml
Aloe vera gel	5ml
Sodium benzoate	0.1g
Water	40ml
Lavender oil	1-2 drops

**Pre formulation study****Organoleptic properties:**

Sensational organs like the eyes and nose were used to examine the substances. It includes the herbal components' macroscopic characteristics.

- Odour
- Colour
- Texture

**Physicochemical Properties****pH****Method:**

Use a pH meter to measure the pH value of hair mask [17]

**Solubility**

**Methods:** One gram of the substance, or powdered, was precisely weighed and transferred into a beaker with 100 millilitres of water. This was shaken vigorously, heated to increase the solubility, cooled, and filtered; the residue is then weighed and recorded. The term "solubility of substance" refers to the amount of substance that passes into solutions to achieve saturated solutions at constant temperature and pressure.

**Methodology**

**Weighing of all ingredients:** A digital balance was used to precisely weigh each of the necessary materials for making the hair mask.

**Preparation of Hair mask**

Take 40ml of distilled water. Add 1-2g of chrysanthemum flower powder in it.

Now mix the water for some time. Filter the flower extract with Watts man filter paper.

**Mixing of ingredients**

- Added 5g flaxseeds to the 10ml water.
- To prevent the flaxseeds from adhering to the utensils' base, boil this water for about ten minutes while stirring constantly.

Turned the burner off when you achieved gel like texture too denser nor too thin

- Allow the gel to cool for approximately one hour while it thickens.

- Empty the gel into a glass measuring cup after placing the muslin cloth inside.
- To strain it, squeeze the gel off the muslin cloth into the measuring cup.
- Stir until it transforms from a milky white to a texture and color similar to Vaseline.
  1. Add 5ml of coconut oil in the mixture of flower extract and let it infuse for 15-20 min.
  2. Strain the oil using a fine sieve to remove the flower residues.
  3. Add 5ml Aloe vera gel and 5ml glycerine in the mixture of extract.
  4. Add 1.5ml of vitamin E oil in it.
  5. Now add 5g of rice flour in water and mix it in the mixture for the thickness of hair mask.
  6. Finally add 0.1 g of sodium benzoate as a preservative.

**Herbal hair shampoo****Table 3: Ingredients for herbal shampoo preparation**

Sr. no.	Ingredients	Quantity	
1.	Chrysanthemum	1.4g	
2.	Banyan roots		10ml
3.	Aloe vera	3ml	
4.	Glycerin	3ml	
5.	Rosemary	1.38g	
6.	Sodium lauryl sulfate	0.80g	
7.	Water	24ml	
8.	Sodium benzoate	0.2g	
9.	Lavender oil	1-2	Drops

- **Banyan roots (for shampoo)**

**Constituents**

Flavonoids, Tannins, alkaloids, glycosides, saponins and sterols.

**Uses**

It offers hair strengthening, growth promotion, hair loss reduction, and scalp health enhancement. Using banyan root extracts on a regular basis helps enhance the hair's texture and sheen, giving it a healthier, more vibrant appearance. Keep your hair out of the sun and other UV radiation sources [18].

- **Rosemary leaves (for shampoo, hair serum)**

#### Constituents

Phenolic acids, flavonoids, monoterpenes, diterpenes and triterpenes.

#### Uses

It provides a natural method of hair care by promoting hair development, fortifying hair follicles, minimizing dandruff, and enhancing scalp health. Rosemary is used to treat a number of illnesses as a diuretic, digestant, and flavouring agent in cosmetic products [19,20].

- **Aloe vera gel (for shampoo, mask, serum)**

The Liliaceae family includes the aloe vera plant. Global distribution zones are covered. This species, which is more commonly known as Aloe vera Pontianak, is cultivated commercially in West Kalimantan, Indonesia [21]. The food, pharmaceutical, and cosmetic industries all employ aloe vera [22].

#### Uses

Keeps hair hydrated without making it greasy. Soothes an itchy scalp and fights dandruff with its antifungal properties. Acts as a natural conditioner, making hair softer and shinier. Strengthens hair, reducing split ends and breakage [22].

- **Glycerin (for mask, serum and shampoo)**

#### Uses

By absorbing moisture from the air and retaining it in the hair and scalp, glycerin, a natural humectant, can be used to hydrate hair, lessen frizz, and encourage healthy, glossy locks. A dry, itchy scalp can be soothed and hydrated with glycerin, which may lessen dandruff and create a better environment for the scalp. As fats and oils hydrolyze, natural glycerin is produced as a byproduct [23]. For extra moisturizing advantages, mix a few drops of glycerin into your usual shampoo or conditioner. To make a hydrating hair mask, serum and shampoo combine glycerin with additional substances such as honey, coconut oil, or aloe vera.

- **Sodium Lauryl sulfate (for shampoo)**

SLS effectively removes oil and debris from hair, leaving it feeling clean and renewed.

- Shampoo and other hair products frequently contain sodium lauryl sulfate (SLS), a surfactant that produces lather and efficiently removes oil and debris.

- While a mild shampoo can be diluted to a much lower SLS concentration for dry hair or sensitive scalps, a regular shampoo typically uses an SLS concentration of 10–25% [24,25]

#### Preparation of herbal Shampoo

##### Phase A

- Firstly, take 24ml distilled water for making 30 ml herbal hair shampoo.
- Take Chrysanthemum flower and grind it until it becomes powdered. Then dissolve Chrysanthemum flower extract in 30ml water.
- Stir it well and strain the mixture using a Whatman filter paper. Now we have chrysanthemum extract as our base ingredient.

##### Phase B

- In a separate beaker take 0.8 g of SLS and add 7ml water in it.
- Now take 3ml of SLS from it and stir gently to prevent excessive foam.

##### Phase C

- Combine Phase A and B.
- Carefully add phase B into phase A with continuous stirring

##### Phase D

- Take banyan roots and clean or wash it properly with water.
- Take water in a beaker and add banyan roots in it. Boil it for 15 minutes.
- Cool down it for some time and then filter it. Take the 10ml of filtered liquid.

##### Phase E

- Now add phase D in phase C.
- Add 3ml aloe vera gel and 3ml of glycerine in it. Mix well.

##### Phase F

- Take 1.3 g of rosemary dried leaves. Make the powdered of these leaves.



- Add 10ml of distilled water in it. Boil it for 10 min. Cool down for some time.
- Then mix properly and filter it with Watsman filter paper.
- Take 3ml of rosemary liquid extract and add in Phase E.

#### Phase G

- Take 0.2g of Sodium benzoate and add in 5ml distilled water.
- Take 2ml of sodium benzoate and add in Phase F.
- Add lavender oil for fragrance and scalp benefits.
- Let the shampoo sit for few hours to remove bubbles. Now pour it into clean bottle and store in a cool or dry place.

#### Herbal hair serum

**Table 4:** Ingredients for herbal hair serum

Sr. No.	Ingredients	Quantity
1.	Chrysanthemum powder	2 tablespoons
2.	Olive oil	5ml
3.	Rosemary leaves	2 tablespoons
4.	Vitamin E	2-3drops
5.	Glycerin	3ml
6.	Aloe vera gel	5ml
7.	Sodium benzoate	0.1g
8.	Water	20ml
9.	Rosemary water	0.5ml

#### • Olive oil (for serum)

##### Constituents of Olive oil

Antioxidants, fatty acids, Vitamins including oleic acid, squalene and vitamin E.

##### Uses

Hair can be hydrated, frizz-free, shiny, and healthier overall using olive oil. Olive oil enhances the general texture and manageability of hair, giving it a healthy sheen. Olive oil's substantial phenolic component content has demonstrated its organoleptic qualities and longevity [26]. Olive oil's anti-inflammatory qualities may lessen dandruff and relieve an itchy, dry scalp.

#### • Rosemary water (for serum)

##### Uses

Refers to a number of possible advantages for hair, such as fostering growth, fortifying hair, relieving a dry scalp, and enhancing luster, all of which are made possible by its anti-inflammatory and antioxidant qualities.

##### Preparation of herbal hair serum

##### Phase A

1. Take 2 tablespoon of dried chrysanthemum flower.
2. Heat 20ml of distilled water in a beaker for 10 minutes.
3. Cool down it for some time and then add the flowers to the simmer water. Let it steep for 10-15 minutes.
4. Mix the flower extract or water with continuous stirring.
5. Strain the mixture using a Watsman filter paper. Now we have chrysanthemum extract as our base ingredients.

##### Phase B

1. Take 2 tablespoon of dried rosemary leaves in the beaker. Now add 30ml of water in the beaker of rosemary leaves.
2. Boil this water for 10-15 minutes until its colour changes into brownish.
3. Cool down it for some time and then strain the mixture with filter paper.
4. Then add this mixture in Phase A.

##### Phase C

1. Now add 3ml glycerine in the mixture of Phase B and 5ml olive oil in it.
2. Add 5ml of aloe vera gel in the mixture.
3. Lastly add rosemary water for fragrance.
4. Stir well until all ingredients are combined smoothly.

##### Phase D

1. Pour the serum in the dark clean bottle. Store the bottle in clean and dry place.

**Instructions for usage**

- A tiny quantity of the hair growth serum should be applied to the scalp and hair roots.
- To encourage absorption, gently massage the serum into the scalp in circular strokes.
- For best results, leave the serum on for at least half an hour or overnight.
- As usual, rinse with lukewarm water and shampoo.
- For optimal effects, incorporate the serum into your hair care regimen on a daily basis.

**III.RESULTS AND DISCUSSION****Evaluation of Herbal Hair Mask****Table 5:** Evaluation of herbal hair mask

Sr. No	Test	Observation
1.	Colour	White
2.	Nature	Semisolid paste
3.	Odor	Pleasant
4.	Texture	Smooth
5.	pH	6.5
6.	Washability	Easily washed
7.	Nature of hair after wash	Smooth
8.	Skin irritation	Absent
9.	Eye irritation	Absent
10.	Patch test	Absent

**Evaluation parameter of herbal hair mask.**

Prepare formulation of hair mask were subjected to following evaluation parameter:

**Organolectic properties:** The examination of formulation was performed under the evaluation it involves macroscopic aspects of the drug or product such as color, Odor, texture by using sensory organ as eye or nose as shown in Figure 7.

**Figure 1:** Chrysanthemum Herbal hair mask**Physiochemical properties****A) pH**

The pH of 10% hair mask solution in distilled water was determined at room temperature 25degree Celsius. The pH was measured by using digital pH meter.

**B) Wash ability**

Formulation was applied on the skin and ease and extend of washing with water were checked manually [27]

**C) Nature of hair after washes**

Nature of hair after washes can be done by collecting the response of volunteers as shown in Figure 2 [28].







Figure 2: Nature of Hair

#### D) Irritancy

In this procedure, a small amount of moistened formulation is applied to the hand surface and the effect of the formulation or irritancy and itching have been noticed. Mark the area, on the left-hand dorsal surface. Then the masked were applied to the area and the time noted. After interval up to 3hr, it is checked for irritancy effect as shown in Figure 3.



Figure 3: Evaluation of Irritancy.

#### Procedure for application of hair mask

- Fill a bowl with the necessary amount of herbal hair mask.
- Hand gloves or a hair brush can be used to apply the paste from the scalp to the ends.
- After 30 minutes, wash your hair with diluted shampoo.

#### Evaluation of *Chrysanthemum* Herbal Shampoo

1. **Physical appearance:** Grey brown, pleasant smell.

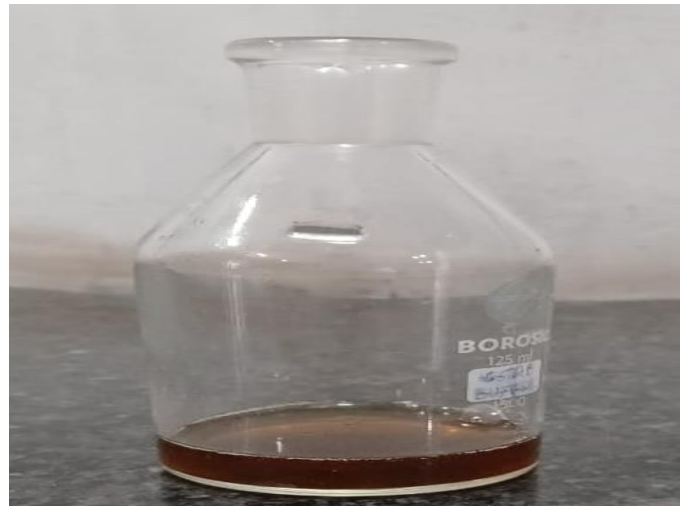


Figure 4: *Chrysanthemum* Herbal shampoo

**Table 6:** Physical appearance of herbal shampoo

Sr. no.	Test	Observation
1.	Colour	Brown
2.	Nature	Liquid
3.	Odour	Pleasant
4.	Texture	Smooth
5.	pH	5.5
6.	Nature of hair after wash	Smooth
7.	Skin irritation	Absent

**Determination of pH:** The pH of herbal shampoo has been shown to be important and enhancing the qualities of hair, minimizing irritation to the eyes, and stabilizing the ecological balance of the scalp. The current trend to promote herbal shampoo flowers. pH is one of the ways to minimize damage to the hair. The pH of the shampoo is 5.5.

**2. Solubility Check:** Mix 2ml shampoo in 100ml water. Heat it in the water bath for 10min. After 10mins shampoo was easy for applying in hair.

**3. Cleansing Action:** 5g of wool yarn in 2ml+ 100ml water

$$DP=100(1-T/C)$$

DP= Percentage of detergency power

T= Weight of sebum (test) sample.

C= Weight of sebum in the control sample.

$$C= 0.58$$

$$T= 0.74$$

$$DP= 100(1-0.74/0.58)$$

$$= 100 \frac{(0.58-0.74)}{0.58}$$

$$DP= 28\%$$

**Figure 5:** Cleansing action of shampoo

**4. Foam Determination:** Total solution: **3.8cm**

Foam solution: **0.7cm**

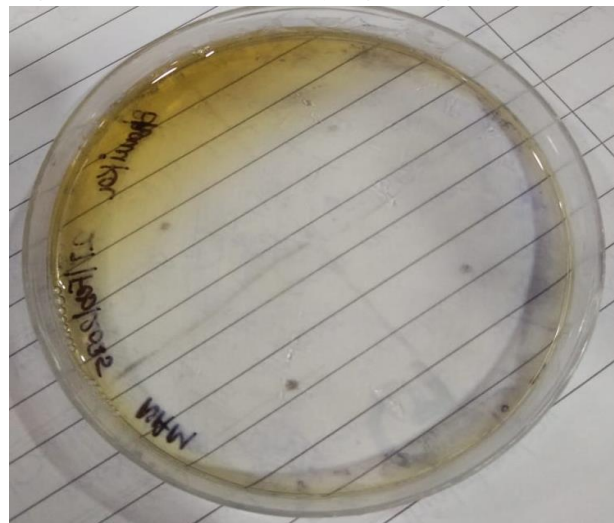
**Figure 6:** Foam determination

**5. Determination of solid content:**

A clean dry China dish was weighed and 4gram of shampoo was added to it. The weight of dish and shampoo was noted. The exact weight of shampoo was calculated. Place the China dish with herbal shampoo on hot plate until the liquid portion was evaporated. The weight of shampoo after drying was calculated as show in figure 7.

**Petri-plate weight: 9.4g**

**Weight of shampoo after drying: 8.94g**



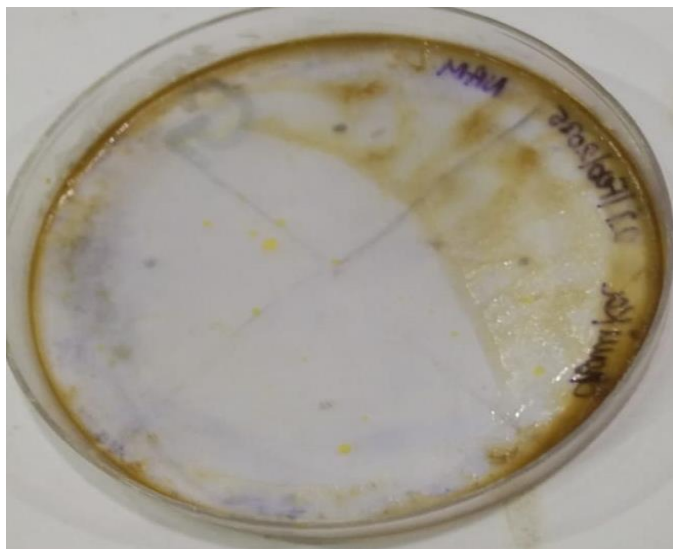


Figure 7: Check the weight before and after drying of petri-plates

6. **Nature of hair after washing:** The hair was found to be shiny, soft and silky.
7. **Stability study:** Stability and acceptability of organoleptic properties of formulation during the storage period indicated that they are chemically and physically stable. The shampoo was observed for physiochemical changes were observed. The shampoo was found to be stable.
8. **Dirt Detergency:** It was performed as the evaluation producer. The dirt detergency activity of shampoo was found to be as moderate.



Figure 7: Dirt detergency

### Evaluation of *Chrysanthemum* Herbal Serum

**Physical appearance:** The physical look, color, and feel of a created herbal hair serum were assessed visually. No foreign particles were present. There was a translucent finish that applied easily and neatly, coupled with a yellow hue. The physical attributes, color, and texture of the final product Samples of herbal serum were analysed [29].



Figure 8: Chrysanthemum herbal hair serum

Table 7: Physical Appearance of herbal hair serum

Sr. no.	Test	Observations
1.	Colour	Yellow colour
2.	Nature	Liquid
3.	Odour	Pleasant
4.	Draize eye test	No irritation
5.	pH	6
6.	Nature of hair after applying	Smooth
7.	Skin irritation	Absent
8.	Spreadability	Good

### pH

It was found that the prepared herbal serum had a pH of 6, which is appropriate for formulation. The pH of the serum was measured by used pH paper [30].

### Spreadability

Spreadability was measured using the parallel plate method, which is used to evaluate and quantify spreadability. Two horizontal plates, each measuring 20 by 20 centimeters, were positioned between a little amount of serum. The spread diameter was measured



one minute later. Spreadability was determined by applying the formula,

$$S = M \times L / T.$$

S stands for spreadability.

M is the pan's weight (attached to the upper slide). L = Length that the glass slide moved. T = Total time (in seconds) required to fully separate the slides as shown in fig 9[31].



**Figure 9: Spreadability was determined by applying the formula**

$$S = \frac{428.28 \times 6.9}{30}$$

$$S = 98.50$$

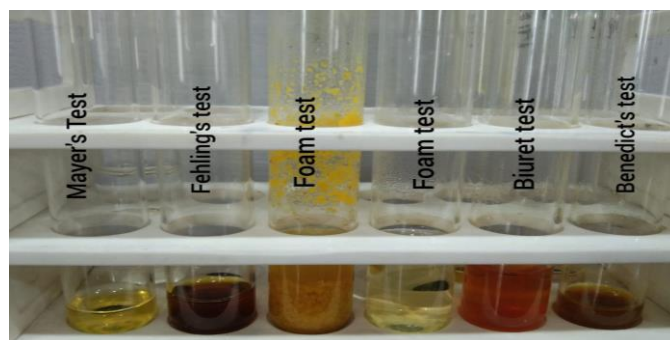
### Phytochemical Evaluations

Chrysanthemum flower was evaluated for phytochemical parameter showed in Table 1. It was found to be presence of phytoconstituents such as carbohydrates and absence of proteins and alkaloids.

### Phytochemical evaluation

**Table 8:** Phytochemical evaluation of chrysanthemum flower

Sr. No.	Test	Purpose of detection	Result
1.	Mayer's test	Presence of alkaloids	Absent
2.	Fehling test	Presence of carbohydrates	Positive
3.	Foam test	Presence of saponins	Absent
4.	Benedict's test	Presence of carbohydrates	Positive
5.	Biuret test	Presence of proteins	Absent



**Figure 10: Phytochemical evaluations**

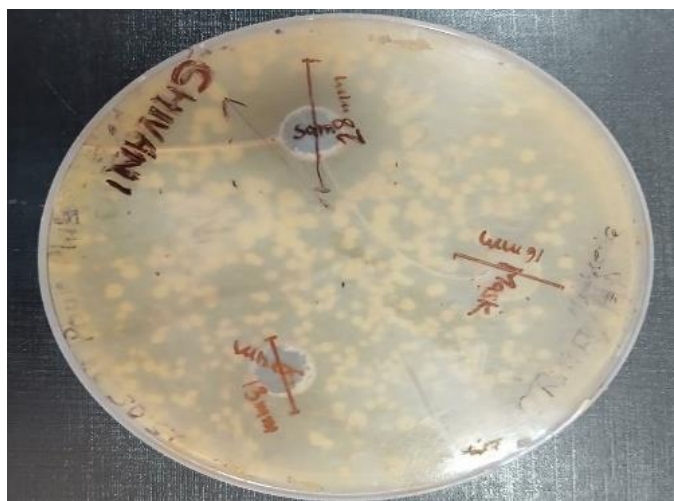
### Microbial Assay

Every sample was found to have an inhibiting impact on Salmonella typhi. When compared to other sample, shampoo showed the largest zone of inhibition (28 mm). Fig 12 shows the inhibitory effects of several sample against Salmonella typhi.

By measuring the zones of inhibition, the antifungal activities were evaluated in mm.

**Table 9:** Inhibitory effects of several sample

Sr. no.	Sample	Zone of inhibition
1.	Shampoo	28mm
2.	Hair Serum	13mm
3.	Hair Mask	16mm



**Figure 11: Zone of inhibition**

#### IV. CONCLUSION

According to the study's findings, an herbal powder hair mask, hair shampoo and serum can be prepared, diluted with the necessary amount of water, and applied to hair with the hands before being rinsed off in 30 minutes to make hair powerful, glossy, and so forth by incorporating organic herbs. Since every ingredient is natural, there aren't any documented adverse consequences for the hair. Cosmetics made from herbs are well-liked since they are safe. Rice flour, coconut oil, flax seeds, and chrysanthemum powder were the herbal ingredients utilized to make the hair mask. The goals of optimizing chrysanthemum benefits, enhancing hair quality, and comparing favourably with commercial alternatives were all accomplished by the shampoo composition. Users reported increases in hair strength, gloss, and manageability as a result of the addition of chrysanthemum extract. Rosemary leaves are used for making herbal shampoo and herbal serum to stimulate hair growth and improve scalp health. This mask and hair shampoo, serum helps to prevent frizzy hair, stimulate hair and reduce hair dandruff. Poor hygiene and an oily scalp are the main causes of dandruff. Future researchers may find this study useful in creating an herbal hair mask and assessing its effectiveness based on empirical evidence.

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#### VI. AUTHORS CONTRIBUTIONS

Experimentation was done by Shivani. The manuscript preparation was done by Shivani and Gurinder. The proof reading was done by Dr. Puneet and lab facility was provided by Harpreet Kaur.

#### VII. CONFLICTS OF INTERESTS

There was no conflict of Interest.

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