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## Research Paper

# Herbal Hair Serum Formulation Using Fenugreek and Selected Botanicals

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## ABSTRACT

The current study is about creating and testing a herbal hair serum made from fenugreek and other natural botanical ingredients as a replacement for synthetic hair products. Hair is an important part of how people look, and many factors such as pollution, stress, poor diet, and chemical treatments cause common hair problems like hair loss, dandruff, dryness, and damage. To combat these issues, a polyherbal serum was made using natural ingredients that are known for their healing and beauty benefits. The serum included fenugreek seeds, aloe vera, hibiscus, neem, and rice water as the active parts, along with other ingredients like glycerin, rose water, vitamin E, and purified water. These ingredients were chosen because they help with hair growth, nourishing the scalp, fighting bacteria, and making hair easier to manage. The herbal extracts were made using water-based methods and then mixed into a serum base to create a smooth and uniform product. The developed herbal hair serum was tested for several physical and chemical properties such as how it looks, pH level, thickness, how easily it spreads, how stable it is, and if it causes any skin irritation. The results showed that the serum had a clear, smooth, and slightly thick texture with a nice smell. The pH level (between 5.2 and 6) was suitable for use on the scalp and didn't cause irritation. The serum had a moderate thickness and spread easily, making it simple to apply. Stability tests showed that the product didn't change much under different storage conditions and didn't cause any skin irritation. The combination of the herbal ingredients helped improve hair texture, reduce hair loss, increase shine, and enhance scalp health. In conclusion, the study found that the created herbal hair serum is safe, effective, stable, and affordable, making it a good natural alternative for keeping hair and scalp healthy..

## INTRODUCTION

Hair is a key part of how people look and helps make them more attractive. It is a type of

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keratinized skin structure that grows from hair follicles in the skin. Taking care of your hair properly is important to keep it strong, shiny, and looking good [1]. Human hair is mostly made of keratin, a protein that gives it strength and flexibility. The growth of hair depends on the health of the hair follicles, and many things both inside and outside the body can affect how healthy your hair is. Common hair issues include dandruff, hair loss, dryness, split ends, frizz, and scalp irritation. These problems can be caused by pollution, stress, not eating well, hormone changes, and bad hair care habits [2,3].

### **Hair serum**

Hair serum is a silicone-based, lightweight liquid product applied to the hair to enhance its appearance, texture, and overall health. Unlike oils, which penetrate the scalp and hair shaft, serums mainly work by coating the hair strands. This coating gives the hair an instant shine, makes it smoother, and helps protect it from external damage. A hair serum is a light liquid used to make hair look better and healthier. It creates a protective layer on the hair shaft, helps reduce frizz, adds shine, and guards against damage from the environment like heat, dust, and pollution [4]. Herbal hair serums are made with natural plant ingredients and provide nourishment without the harmful effects of chemical products [5,6].

Ingredients like fenugreek, aloe vera, hibiscus, neem, and rice water are commonly used in hair care because of their helpful qualities. Fenugreek strengthens the hair roots and helps with hair loss, aloe vera keeps the scalp moisturized, hibiscus encourages hair growth, neem helps with dandruff, and rice water improves the texture and shine of hair [7].

For these reasons, herbal hair serums are becoming more popular as a safe and effective choice compared to synthetic hair products. They help nourish the scalp, improve the texture of hair,

reduce damage, and support healthy hair growth in a natural way [8].

### **Benefits and Advantages of Herbal Hair Serum**

- Forms a protective coating on hair strands, helping shield them from heat, dust, and pollution.
- Enhances shine and smoothness, giving hair a healthy and polished look.
- Minimizes frizz and dryness, improving hair manageability.
- Provides nourishment to both scalp and hair through natural plant-based ingredients.
- Reduces hair breakage and supports stronger strands, thereby limiting hair fall.
- Helps retain moisture, keeping hair soft and hydrated.
- Improves overall hair texture, making it silky and easy to style.
- Supports healthier hair growth by maintaining a balanced scalp condition.
- Assists in controlling dandruff and soothing scalp irritation.
- Offers a lightweight, non-greasy alternative to traditional hair oils.
- Helps in reducing split ends and preventing further damage.
- Free from harsh chemicals, making it suitable for regular and long-term use [9-11].

## **MATERIALS AND METHODS**

### **Material**

#### **Herbal ingredients**

Fenugreek seeds – for promoting hair growth, strengthening hair follicles, reducing hair fall, and improving hair texture.

Aloe vera gel – for moisturizing and soothing the scalp, reducing dandruff and irritation, nourishing hair follicles, and promoting healthy hair growth.



Hibiscus flowers – for stimulating hair growth, preventing premature greying, conditioning hair, adding thickness and shine; rich in amino acids and vitamins.

Neem powder – for antibacterial and antifungal action, prevention of dandruff and scalp infections, and maintenance of scalp hygiene.

Rice water – for strengthening hair, improving elasticity, adding natural shine, and reducing hair breakage; contains vitamins B, C, E, and amino acids [12-16].

### **Excipients**

Glycerin – acts as humectant.

Purified water – act as a solvent and base for serum.

Vitamin E – acts as an antioxidant.

Rose Water – acts as perfume [17-20].

### **Method of Extraction**

All herbal ingredients were extracted using the aqueous extraction method, which involves soaking, boiling, grinding, and filtration to obtain bioactive constituents from plant materials.

### **Fenugreek Extract**

Accurately weighed fenugreek seeds (8 g) were taken and washed to remove impurities. The seeds were then added to 30 ml of distilled water in a clean beaker. The mixture was heated and boiled for 10–15 minutes with continuous stirring to facilitate extraction of active components. After boiling, the mixture was allowed to cool to room temperature. The cooled mixture was then filtered through muslin cloth to remove solid residues. The filtrate obtained was collected as fenugreek extract and used for further formulation [21].

### **Rice Water Preparation**

Rice (15 g) was washed thoroughly and soaked in distilled water (30 ml) for 24 hours. The liquid portion was then filtered to obtain rice water extract rich in nutrients [22].

### **Aloe Vera Extract**

Fresh aloe vera leaves were washed, and the outer peel was removed. The inner gel was collected and homogenized using a mixer to obtain a smooth extract [23].

### **Hibiscus Extract**

Hibiscus flowers and leaves (12 g) were washed and crushed. The material was boiled in distilled water (30 ml) for 10–15 minutes, followed by cooling and filtration to obtain the extract [24].

### **Neem Extract**

Neem leaves (8 g) were washed and boiled in distilled water (25–30 ml) for 10–15 minutes. The solution was cooled and filtered to obtain neem extract [24].

### **Method of Preparation**

- Take clean and dry beaker, and the base of the formulation was prepared by mixing rice water, rose water, and distilled water with continuous stirring using a glass rod.
- Fenugreek extract was added slowly with constant stirring, followed by hibiscus extract and neem extract. The mixture was stirred thoroughly after each addition to ensure uniform mixing.
- Next, aloe vera gel was incorporated gradually into the mixture with continuous stirring to obtain a smooth and homogeneous consistency.
- After that, glycerin was added as a humectant to improve moisture retention properties of the serum. A small quantity of preservative was then added to enhance the stability of the formulation.
- The final mixture was stirred continuously for 5–10 minutes to achieve uniformity. The pH of the formulation was checked and maintained within the range of 5–7, suitable for scalp application.



- Finally, the prepared herbal hair serum was properly labelled, and stored at room temperature.

**Table no. 1. Formulation Table for Herbal Hair Serum**

Sr.no.	Ingredients	F1	F2	F3	Purpose
1	Fenugreek Extract	8 ml	10 ml	12 ml	Promotes hair growth, strengthens follicles, reduces hair fall
2	Rice Water	16 ml	14 ml	12 ml	Improves elasticity, adds shine, reduces breakage
3	Aloe Vera	20 ml	18 ml	16 ml	Moisturizes scalp, reduces dandruff, nourishes hair
4	Hibiscus Extract	12 ml	10 ml	8 ml	Stimulates growth, adds thickness and shine
5	Neem Extract	8 ml	8 ml	8 ml	Antibacterial, prevents dandruff and infections
6	Glycerin	3 ml	3 ml	3 ml	Acts as humectant
7	Rose Water	8 ml	8 ml	8 ml	Fragrance, maintains pH
8	Vitamin E	1 ml	1 ml	1 ml	Acts as an antioxidant
9	Purified Water	q.s. to 80 ml	q.s. to 80 ml	q.s. to 80 ml	Act as a solvent and base for serum

### Evaluation Parameters

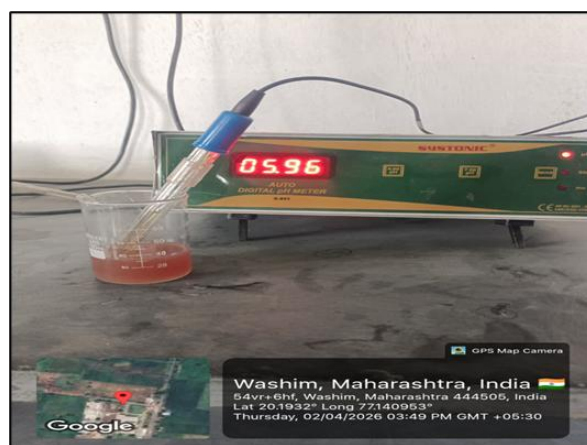
The prepared herbal hair serum was subjected to various physicochemical and performance evaluations to ensure its safety, efficacy, and stability. The following parameters were assessed:

#### 1. Physical Appearance

- Observation:** The formulation appeared as a smooth, semi-viscous, clear gel with a pleasant floral aroma and no visible particulate matter.
- Inference:** Uniform and aesthetically acceptable for topical application.

#### 2. pH Determination

- Method:** The pH was measured using a calibrated digital pH meter.
- Result:** pH ranged between 5.2 and 6, which is ideal for scalp application and compatible with natural skin pH.
- Inference:** Non-irritant and safe for regular use.



**Fig. no. 1: pH Test**

#### 3. Viscosity

- Method:** Measured using a Ostwald viscometer.
- Result:** The serum exhibited moderate viscosity, suitable for easy application and spreadability.
- Inference:** Indicates appropriate consistency for serum texture.

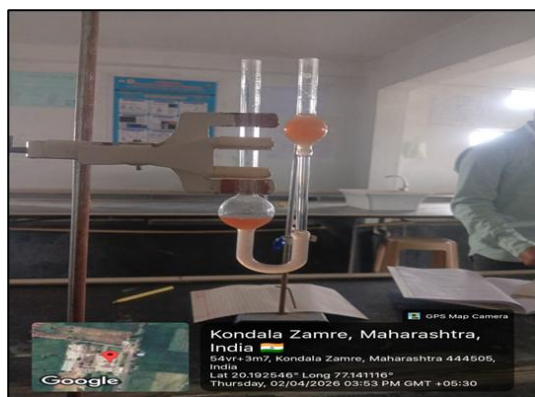


Fig. no. 2: Viscosity

#### 4. Spreadability

- **Method:** Evaluated by placing a fixed quantity between two glass slides and applying a standard weight.
- **Result:** Good spreadability without dripping or excessive stickiness.
- **Inference:** Ensures smooth application on the scalp and hair strands.



Fig. no. 3: Spreadability

#### 5. Stability Studies

- **Conditions:** Stored at room temperature (25°C), refrigerated (4°C), and accelerated conditions (40°C) for 2 days.

Table no. 2: Result Table for Herbal Hair Serum

Parameters	F1	F2	F3	Inference
Physical Appearance	Clear, smooth, semi-viscous	Clear, slightly thick	Clear, smooth, semi-viscous	All batches acceptable
pH	5.2	5.5	5.9	Within ideal scalp range (5–7)
Viscosity	Moderate	Moderate high	High	Suitable consistency
Spreadability	Moderate	Good	Good	Easy application

- **Parameters Monitored:** Color, odor, pH, phase separation.
- **Result:** No significant change in physical properties; no phase separation observed.
- **Inference:** The formulation is physically stable over time.

#### 6. Skin Irritation Test

- **Method:** Patch test on forearm skin.
- **Result:** No signs of redness, itching, or irritation.
- **Inference:** Safe for topical application on skin/scalp.

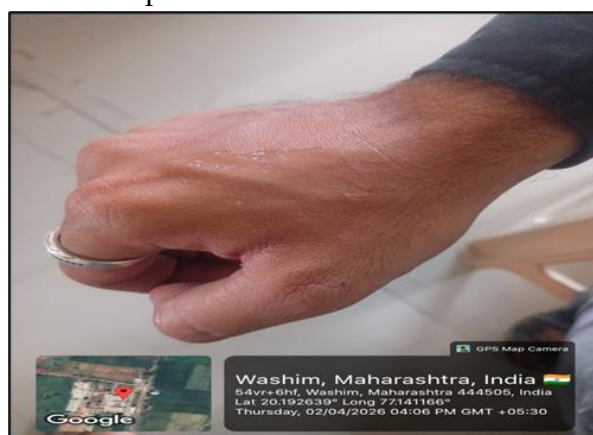


Fig. no. 4: Skin Irritation Test

## RESULT AND DISCUSSION

### RESULTS

The formulated herbal hair serum using fenugreek, Aloe vera, Hibiscus, Rice water, and Neem was subjected to physicochemical analysis, stability testing, and evaluation test. The findings are given below in table:

Stability	Stable	Stable	Stable	No phase separation
Skin Irritation	No irritation	No irritation	No irritation	Safe for use

## DISCUSSION

The present study was carried out to formulate and evaluate a herbal hair serum using fenugreek and selected botanical ingredients. The aim was to develop a natural, safe, and effective alternative to synthetic hair care products.

The prepared serum exhibited a smooth, clear, and homogeneous appearance with a pleasant odor, indicating proper mixing and good formulation technique. The pH of the formulation (5.2–6) was found to be within the acceptable range for scalp application, suggesting that it is non-irritant and suitable for regular use. The viscosity of the serum was moderate, which ensures easy application without being too thick or too thin. The formulation also showed good spreadability, allowing uniform distribution on the scalp and hair. Stability studies revealed no significant changes in physical properties under different storage conditions, indicating good stability of the formulation. The skin irritation test showed no signs of irritation, confirming its safety for topical use.

- **Fenugreek** provides proteins and mucilage that strengthen hair and reduce hair fall.
- **Aloe vera** acts as a moisturizer and soothes the scalp.
- **Hibiscus** promotes hair growth and improves thickness.
- **Neem** provides antimicrobial action, helping to control dandruff and scalp infections.
- **Rice water** enhances hair strength and shine due to its amino acids and vitamins.

These combined effects contribute to improved hair texture, reduced dryness, better scalp health, and overall nourishment.

## SUMMARY AND CONCLUSION

The present study was carried out to formulate and evaluate a herbal hair serum using fenugreek and selected botanical ingredients such as aloe vera, hibiscus, neem, and rice water. The aim was to develop a natural, safe, and effective alternative to synthetic hair serums. The herbal extracts were prepared using aqueous extraction methods and incorporated into the formulation along with suitable excipients like glycerin, rose water, vitamin E, and purified water. The serum was prepared by proper mixing to obtain a homogeneous and stable formulation. The prepared serum was evaluated for various physicochemical parameters such as appearance, pH, viscosity, spreadability, stability, and skin irritation. The results showed that the formulation had good physical appearance, suitable pH, moderate viscosity, and excellent spreadability. It remained stable under different storage conditions and showed no signs of irritation on the skin. The presence of herbal ingredients contributed to improved hair health by nourishing the scalp, reducing hair fall, controlling dandruff, and enhancing hair texture and shine. Overall, the study concluded that the formulated herbal hair serum is safe, stable, effective, and economical, and can be used as a natural alternative for maintaining healthy hair and scalp. The present study successfully focused on the formulation and evaluation of a herbal hair serum using fenugreek and selected botanical ingredients such as aloe vera, hibiscus, neem, and rice water. The prepared formulation showed satisfactory physicochemical properties, including appropriate pH, moderate viscosity, good spreadability, and appealing physical appearance. The stability studies



confirmed that the serum remained stable under different storage conditions without any significant changes in color, odor, or consistency. The skin irritation test indicated that the formulation is safe and non-irritant, making it suitable for regular topical application.

The herbal ingredients used in the formulation play an important role in improving hair health by nourishing the scalp, strengthening hair roots, reducing hair fall, controlling dandruff, and enhancing hair texture and shine. The synergistic effect of these natural components increases the overall effectiveness of the serum. Thus, it can be concluded that the developed herbal hair serum is a safe, stable, effective, and economical alternative to synthetic products, with promising benefits for maintaining healthy hair and scalp.

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