International Journal of Pharmacy and Pharmaceutical Research (IJPPR)
Volume 32, Issue 5, May 2026 ijppr.humanjournals.com ISSN: 2349-7203

Formulation and Evaluation of Herbal Hair Serum from Hibiscus Extract

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Received: 30 March 2026 Revised: 25 April 2026 Accepted: 30 April 2026

ABSTRACT:

This study focuses on the development and comprehensive assessment of a natural, hibiscus-based herbal hair serum designed as a safer, chemical-free alternative to synthetic cosmetic products.The serum utilizes a blend of botanical ingredients, including Hibiscus rosa-sinensis (flowers and leaves), fenugreek seeds (Trigonella foenum-graecum), flaxseed (Linum usitatissimum), aloe vera gel, and almond oil.These components were selected for their documented therapeutic properties, such as promoting hair growth, strengthening follicles, reducing dandruff, and providing essential nourishment without the stickiness of traditional oils.The research involved preparing five distinct formulation batches (F1–F5), which were then evaluated based on several parameters: physical appearance, pH levels, viscosity, spreadability, stability, and skin irritation. Results indicated that formulation F1 was the most effective, demonstrating optimal homogeneity, a scalp-compatible pH of 6.5, and excellent stability at room temperature. The final product proved to be non-irritating and showed significant antimicrobial activity. Ultimately, the study concludes that this herbal serum effectively delivers vital nutrients like omega-3 fatty acids and Vitamin E, supporting holistic hair health and development while meeting growing consumer demand for sustainable beauty solutions.

Keywords: Herbal Hair Serum, Hibiscus Extract, Hair Growth, Hair Care, Reduces Hair Fall , Hair Growth Stimulant.

INTRODUCTION:

Hair care is an essential aspect of personal grooming, and the demand for natural and effective hair care products is on the rise. Herbal hair serums, in particular, have gained popularity due to their potential to promote hair growth, improve scalp health, and enhance hair texture. Hibiscus flowers and leaves, rich in vitamins, minerals, and antioxidants, have been traditionally used in hair care for their hair growth promoting properties. The anthocyanins present in Hibiscus flowers have been shown to promote hair growth by increasing blood flow to the scalp and reducing dandruff. This project aims to formulate and evaluate a herbal hair serum from Hibiscus flowers and leaves, exploring its potential as a natural and effective hair care product. The serum will be formulated using a combination of Hibiscus flowers and leaves extracts, and its physical, chemical, and biological properties will be evaluated.

The main purpose of this study is to develop an effective stable herbal hair serum formulation containing specified ingredients while investigating its physical and chemical characteristics as well as stability output. The study works towards determining proper natural ingredient amounts to create a balance in the formulation which provides scalp nourishment along with improved hair look, thickness and control. The evaluation assesses pH and viscosity followed by a spreadability test and stability analyses under various storage environments together with an initial user satisfaction evaluation during sensory testing.

Benefits of Herbal Hair Serum:

1. Adds shine & smoothness

Herbal serums coat the hair strands, making them look glossy, soft, and healthy instead of dull and dry.

2. Controls frizz & dryness

They help tame frizzy hair, flyaways, and rough texture, giving a smoother finish and better manageability.

3. Nourishes hair naturally

Made with plant-based ingredients, herbal serums provide vitamins, antioxidants, and moisture without harsh chemicals.

4. Strengthens hair & reduces breakage

They help repair damaged hair and make strands stronger, reducing split ends and hair fall over time.

5. May support hair growth

Some herbal ingredients (like bhringraj, rosemary, etc.) can stimulate hair follicles and improve scalp circulation, which may encourage healthier growth.

6. Protects from heat & pollution

Hair serums form a protective layer on hair, shielding it from heat styling, UV rays, and pollution damage.

7. Detangles & improves manageability

They make hair easier to comb and style by reducing tangles and roughness.

8. Soothes scalp

Many herbal serums have calming properties that help with itchiness, dryness, or mild irritation.

9. Reduces Scalp Inflammation

Many herbal extracts have cooling and Anti- inflammatory properties**,** which can help with irritation, redness, or mild dandruff.

Methods of preparation :

1. Preparation of hibiscus extract

a) -In a beaker, add 5g of hibiscus powder in 100ml of water

b) -Heat the solution until requisite colour is obtained

c) -Filter the solution and store

2. Preparation of Fenugreek extract

a) -In a beaker, add 5g of fenugreek seeds in 100ml of distilled water and boil the solution for 15 to 20 min.

b) -Filter the solution and keep the solution at room temperature

3. Preparation of Flaxseed Gel

a) -In a beaker, add 5gm of flaxseed in 100ml water

b) -boil the solution for 10 to 15 min on medium heat and stir frequently to prevent sticking or burning

c) -once the gel reaches the desired thickness, remove from heat.

d) -pour the mixture through the muslin cloth

4. Preparation of Aloe vera extract

a) -cut of a green, firm leaf towards the base of the aloe plant, then place it in container for 10 minute to let the yellow latex drain

b) -use a sharp knife to remove first the spines of the leaf, then the broad, flat side of the skin

c) -use a spoon to scoop out the transparent aloe gel, then use a blender to mix the aloe into smooth consistency.

1) Procedure for herbal hair serum

Procedure for preparation of 50ml of herbal hair serum.

Solution 1-

1) In a beaker, add hibiscus extract and fenugreek extract with continuous stirring with a stirrer.

Solution 2-

1) In a beaker, add flaxseed gel, aloe Vera and almond oil and 1 ml of vitamin E with continuous stirring with stirrer.

2) Mix the solution using magnetic stirrer for 15 to 20 minutes.

Solution 3-

1) In a solution 2 add drop wise solution 1 with continuous stirring with a glass rod.

2) To this solution add 0.1gm of sodium benzoate that act as a preservative and add 1 to 2 drops of lavender essential oil that act as a perfuming agent.

3) Then add the distilled water up to volume 50ml and mix the solution using magnetic stirrer for 30 min.

4) Store the serum in well close amber colour serum container.

A hair growth stimulant is any substance, treatment, or method that actively promotes the growth of hair by stimulating the hair follicles and improving the hair growth cycle.

Purpose in Formulation

1. Stimulate hair follicles

- "Activate" weak or dormant follicles
- Push follicles back into the growth (anagen) phase

2. Prolong the growth phase (anagen)

- Keep hair growing longer and thicker
- Delay entry into the shedding (telogen) phase

3. Improve scalp microcirculation

- Increase blood flow to the scalp
- Deliver more oxygen and nutrients to hair roots

4. Counteract hair loss mechanisms

- Reduce DHT hormone effects (a major cause of pattern baldness) • Strengthen follicles to resist breakage

5. Enhance follicle metabolism

- Boost cellular activity in hair roots

- Support protein (keratin) production

6. Support overall hair density

- Increase hair count (density)
- Improve thickness and volume

Adverse Effects of herbal hair serum

1) Scalp Irritation
2) Allergic Reactions
3) Dryness of scalp and hair
4) Excess Oilness and Clogged pores
5) Dandruff like- Flaking

Pharmacology Of Hibiscus Extract:

The pharmacology of hibiscus extract (commonly from Hibiscus rosa-sinensis) explains how its bioactive compounds act on the body—especially the scalp and hair follicles when used in hair formulations.

1. Active constituents (phytochemistry)

Hibiscus extract contains several important compounds: • Flavonoids (quercetin, anthocyanins)

• Saponins • Tannins

• Mucilage (polysaccharides) • Vitamins (Vitamin C, etc.)

These compounds are responsible for its pharmacological actions.

2. Pharmacological actions on hair & scalp

A. Hair growth–promoting activity • Stimulates hair follicles

- May prolong the anagen (growth) phase
- Can increase follicle size and hair thickness Mechanism:
- Flavonoids improve microcirculation in the scalp
- Enhances nutrient supply to follicles

B. Antioxidant activity

- Neutralizes free radicals that damage hair follicles • Protects follicular cells from oxidative stress

Key compounds:

Anthocyanins Vitamin C

C. Anti-inflammatory effect

- Reduces scalp inflammation

- Helps conditions that weaken follicles Mechanism:

- Inhibits inflammatory mediators (like prostaglandins)

D. Antimicrobial activity

- Effective against certain bacteria and fungi - Helps maintain scalp hygiene

Useful in dandruff-prone conditions (linked to Seborrheic dermatitis)

Chemical Composition

The chemical composition of a herbal hair serum refers to the various natural and supporting ingredients combined to deliver hair growth, scalp care, and cosmetic benefits. Even though it's called "herbal," the formulation is a mixture of plant- derived actives + base chemicals that ensure stability and effectiveness.

1. Active herbal constituents (core ingredients) These provide the therapeutic effect.

Plant extracts

- Hibiscus rosa-sinensis extract – promotes hair growth, conditions hair

- Almond Oil (Prunus Amygdalus Dulcis) - Hair moisturizing and conditioning - Fenugreek Seed (Trigonella foenum-graecum) - Hair growth stimulation

- Aloe vera – soothes and hydrates scalp

Phytochemicals present

- Flavonoids – antioxidant

- Tannins – strengthen hair shaft

- Saponins – mild cleansing action - Alkaloids – stimulate follicles

- Glycosides – support scalp metabolism

Process Overview:

1. Selection of raw materials

- Choose herbal ingredients: ○ Hibiscus rosa-sinensis

○ Trigonella foenum-graecum ○ Prunus dulcis oil

Criteria:

- Purity - Quality

- Desired pharmacological activity

2. Cleaning and drying

- Remove dirt, dust, and impurities

- Dry plant materials (shade drying preferred)

3. Size reduction (powdering) • Dried materials are:

o Crushed

o Ground into coarse powder Increases surface area → better extraction

4. Extraction of herbal actives Common extraction methods:

a. Aqueous extraction (decoction/infusion)

- Boil or soak plant powder in water

b. Oil infusion

- Heat herbs in carrier oil (like almond oil)

c. Alcoholic extraction

• Use ethanol to extract active phytochemicals Choice depends on solubility of active compounds.

5. Filtration

• Remove solid residues using: o Muslin cloth

o Filter paper Produces a clear extract

6. Preparation of base (vehicle)

• Prepare the serum base using:

o Water or hydroalcoholic solution o Oils (for oil-based serum)

o Humectants like glycerin

Ensures proper delivery and texture

Evaluation Parameter For Herbal Hair Serum:

1. Phytochemical analysis of Hibiscus extracts:

a) Detection for alkaloids

Dragendroff's test- Dissolve the herbal extract in chloroform. Evaporate chloroform and acidify the residue by adding few drops of Dragendroff s reagent(Potassium Bismuth iodide).

Mayer's test- 2-3 ml of filtrate with few drops of Mayer's reagent Wagner's test- 2-3 ml of filtrate with few drops of Wagner's reagent.

b) Detection for Carbohydrate

s Fehling's test- 1 ml. Fehling's A and 1 mL Fehling's B solutions should be boiled for one minute. Pour in an equal volume of test extract solution. 5-10 minutes in a boiling water bath.

Benedict's test- In a test tube, combine an equal proportion of Benedict's reagent and test extract 5 minutes in a boiling water.

c) Detection for Flavonoids

FeCl3 Test -To the alcoholic solution of the extract add few drops of neutral ferric chloride solution.

Lead acetate solution Test- Test solution with few drops of acetate solution (10%).

d) Detection for Phenols

Ferric chloride test – Few drops of the extract were treated with 5% aqueous ferric chloride.

Clinical and Manufacturing Insights

The clinical and manufacturing insights of a herbal hair serum involve understanding both its biological effectiveness and its production requirements to ensure safety and efficacy. Clinically, herbal hair serums are designed to improve hair growth, reduce hair fall, and enhance scalp health through the action of plant- derived bioactive compounds such as flavonoids, saponins, and tannins found in ingredients like Hibiscus rosa sinensis and fenugreek. These constituents act by improving scalp microcirculation, providing antioxidant protection to hair follicles, reducing inflammation, and prolonging the anagen (growth) phase of the hair.

From a manufacturing perspective, herbal hair serums require careful selection and standardization of plan materials, followed by appropriate extraction techniques such as aqueous, alcoholic, or oil-based extraction to preserve active phytochemicals. The extracts are then incorporated into a stable base system wit controlled pH, viscosity, and appropriate preservatives to prevent microbial contamination.

Conclusion:

- The hebal hair serum was successfully formulated and evaluated. The study was performed with an aim to develop Hibiscus Rosa Sinensis, Flaxseed and fenugreek herbal hair serum.

- Five different hair gel formulations were prepared. Out of five different formulation the F1 formulation gave appropriate colour, homogeneity, pH, spreadability, skin irritation and stability study to minimized side effects of Herbal hair serum.

- all formulation are formulated & evaluated for every parameters. According to the evaluation parameters performed F1 formulation was best formulation from the rest of four formulation.

- The produced herbal hair serum offers a variety of critical nutrients that are crucial for keeping healthy hair and scalp conditions, according study and outcomes shown.

- It contains natural components including hibiscus powder and vitamin E primarily by halting the premature greying of hair. Almond oil, fenugreek and flaxseeds are effective stimulators of hair growth. Flaxseeds are acts as an anti-dandruff agent and involved in to reduce the generation of dandruff flakes. When compared to synthetic chemicals, the components are not dangerous.

- The serum was found to be stable, with optimal pH, viscosity, and homogeneity, and showed no signs of physical instability. Overall, the herbal hair serum effectively delivers essential nutrients, supports hair maintenance, and development. People now a days are really interested in the herbal sector.

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How to cite this article:
Patil Shrikant et al. Ijppr.Human, 2026; Vol. 32 (5): 474-481.
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