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FORMULATION AND EVALUATION OF POLYHERBAL HAIR SERUM

Shruti A. Tanpure*[1], Komal R. Kale[2], Prajakta N. Bhujbal[3], Sarthak D. Narode[4], Jayashri S. Kasar[5]

Student[1,2,3,4], Asst. Proff.[5]

Department of Pharmacy Mrs. Saraswati Wani College of Pharmacy, Ganegaon. Tal. Rahuri, Dist. Ahilyanagar, Maharashtra.

***Corresponding Author: Shruti A. Tanpure**

Student, Department of Pharmacy Mrs. Saraswati Wani College of Pharmacy, Ganegaon. Tal. Rahuri, Dist. Ahilyanagar, Maharashtra.

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ABSTRACT

Environmental factors, stress, and poor hair care practices are typical causes of dandruff, hair loss, and poor hair health. Because herbal formulations are safer, more effective, and have less adverse effects than synthetic medications, they have attracted a lot of interest. The creation and assessment of a polyherbal hair serum comprising neem (Azadirachta indica), hibiscus (Hibiscus rosa-sinensis), curry leaves (Murraya koenigii) extraction is the main goal of this work. The chosen herbal components are well-known for their positive benefits on the health of the scalp and hair. Curry leaves aid in strengthening hair follicles and lowering hair loss, aloe vera has moisturizing and conditioning effects, hibiscus encourages hair development and prevents premature greying, and neem has potent antimicrobial and anti-dandruff qualities. To create a stable formulation, the extracts were made using appropriate extraction techniques and added to a serum base. A number of physicochemical properties, such as pH, viscosity, spreadability, homogeneity, and stability, were assessed for the prepared serum. Its compatibility with the scalp and ability to promote hair growth were also evaluated. According to the findings, the formulation had good stability, acceptable physical properties, and the potential to improve hair texture, lessen dandruff, and stimulate hair growth. In conclusion, the created polyherbal hair serum has remarkable therapeutic potential for preserving healthy hair and scalp and can be regarded as a safe and efficient substitute for synthetic hair care products.[1]

KEYWORD: Hair, Hair Growth, Dandruff, Herb, Scalp.

INTRODUCTION

Cosmetics and the idea of beauty have been used to improve the human body's look since ancient times. Due of their greater efficacy and fewer adverse effects, herbs were mostly utilized in cosmetics in ancient civilization. An essential part of human life is hair. Hair serves as a barrier against the negative effects of the environment. Take temperature, for instance. The cortical cells that make up hair are composed of a protein called keratin. A helical protein is keratin. Type I keratin fibers are acidic amino acid residues, while type II keratin fibers are basic amino acid residues. One of the most important components of our bodies is our hair. A person's overall elegance is influenced by their hair.[2]

Numerous plants and herbal remedies are said to increase hair development and enhance hair quality in the traditional Indian medical system. Since ancient times, herbal formulations have been used because herbal oils have less adverse effects and are more effective at curing connected illnesses. These hair oils are used to address a variety of hair issues, including dryness and thinning hair. Additionally, the hair oils help to prevent dandruff and increase blood flow to the scalp.[3]

AIM AND OBJECTIVE

AIM: To formulate and evaluate a polyherbal hair serum for improving hair growth and reducing hair fall.

OBJECTIVE

- To prepare herbal extracts.
- To formulate the hair serum.
- To evaluate physicochemical properties (pH, viscosity, etc.).

- To check stability and safety.
- To compare with marketed products.[3]

BENEFITS OF HERBAL HAIR SERUM

- **Promotes Hair Growth**: Herbal ingredients like hibiscus and curry leaves help stimulate hair follicles and support healthy hair growth.
- **Reduces Hair Fall:** Natural extracts such as neem strengthen hair roots and minimize hair loss.
- **Controls Dandruff:** Neem and aloe vera possess antimicrobial properties that help reduce dandruff and scalp irritation.
- **Provides Natural Conditioning:** Aloe vera and plant oils moisturize and soften hair, improving texture and smoothness.
- **Adds Shine and Smoothness:** Herbal formulations enhance the natural shine of hair without harmful chemicals.
- **Prevents Scalp Infections:** Antifungal and antibacterial properties of herbs protect the scalp from infections.
- **Minimizes Hair Damage:** Acts as a protective layer against environmental factors like pollution and dust.
- **Safe and Chemical-Free:** Free from harsh chemicals, making it suitable for long-term use with minimal side effects.[4]

MATERIAL AND METHOD

MATERIAL

1. Hibiscus Powder

Hibiscus is a commonly used medicinal plant in hair care formulations. The flowers and leaves are rich in bioactive compounds that nourish hair and scalp.[5]

Pharmacognosy

- **Biological Source:** Dried flowers of Hibiscus rosa-sinensis
- **Family:** Malvaceae
- **Morphology:** Flowers are large, red, and showy with soft petals.
- **Chemical Constituents:** Flavonoids, anthocyanins, mucilage, vitamins (especially Vitamin C), and amino acids.
- **Uses:** Promotes hair growth, prevents hair fall, conditions hair, and delays premature greying.

2. Neem Powder (Azadirachta indica)

Neem is well known for its medicinal and antimicrobial properties and is widely used in scalp treatments.[5]

Pharmacognosy

- **Biological Source:** Dried leaves of Azadirachta indica
- **Family:** Meliaceae
- **Morphology:** Leaves are compound, pinnate, with serrated leaflets; green in color with a bitter taste.
- **Chemical Constituents:** Azadirachtin, nimbin, nimbidin, flavonoids, tannins, and glycosides.
- **Uses:** Antifungal, antibacterial, anti-inflammatory; helps in treating dandruff, scalp infections, and itching.

3. Curry Leaves Powder (Murraya koenigii)

Curry leaves are commonly used in traditional medicine for hair nourishment and strengthening.[5]

Pharmacognosy

- **Biological Source:** Dried leaves of Murraya koenigii
- **Family:** Rutaceae
- **Morphology:** Leaves are pinnate, aromatic, with small dark green leaflets.
- **Chemical Constituents:** Alkaloids (mahanimbine), flavonoids, beta-carotene, proteins, and antioxidants.
- **Uses:** Promotes hair growth, reduces hair fall, prevents premature greying, and strengthens hair roots.

4. Aloe Vera

Aloe vera is a natural ingredient widely used for its moisturizing and soothing properties. It is obtained from the leaves of Aloe barbadensis (family Liliaceae/Asphodelaceae). It contains polysaccharides, vitamins, and enzymes. It helps in hydrating the scalp, reducing dryness, and promoting healthy hair growth. It also provides a cooling and conditioning effect.[6]

5. Glycerine

Glycerine is a humectant commonly used in cosmetic formulations. It is a clear, viscous liquid that attracts moisture from the environment. It helps in maintaining hydration of hair and scalp. Glycerine improves softness and smoothness of hair. It also prevents dryness and brittleness.[6]

6. Propylene Glycol

Propylene glycol is used as a solvent and humectant in formulations. It helps in dissolving active ingredients and improving their absorption. It maintains moisture balance in the product. It also enhances the penetration of herbal extracts into the scalp. It contributes to the stability of the formulation.[6]

7. Methyl Paraben

Methyl paraben is a commonly used preservative in cosmetic products. It prevents the growth of bacteria and fungi. It helps in increasing the shelf life of the formulation. It is effective in low concentrations and ensures product safety. It maintains the quality and stability of the serum.[6]

8. Rose Water

Rose water is a natural aromatic ingredient used for its soothing and refreshing properties. It is obtained from the distillation of rose petals. It helps in maintaining scalp pH and reducing irritation. It provides a pleasant fragrance to the formulation. It also has mild anti-inflammatory and antioxidant properties.[6]

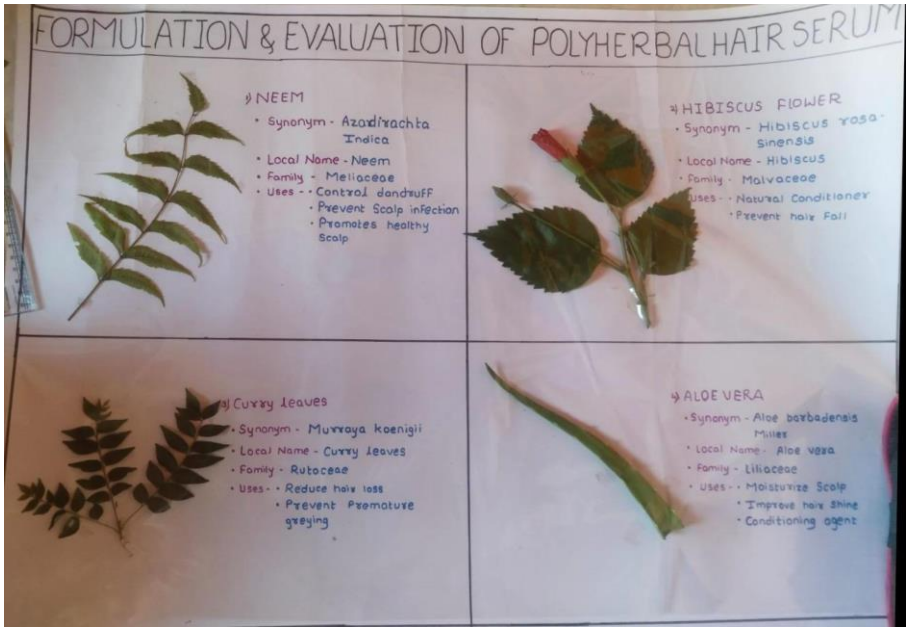
Experimental Work

1. Collection of Herbs

The required herbs such as neem, hibiscus, and curry leaves were collected from nearby local areas. While collecting, care was taken to select only fresh and healthy plant materials without any signs of disease or damage. The collected herbs were washed properly with clean water to remove dust and impurities. After washing, they were dried under shade at room temperature to maintain their natural properties and avoid loss of active constituents.[7]

2. Authentication of Herbs

The collected plant materials were authenticated with the help of a botanist to confirm their identity. This was done by observing their morphological features like color, shape, size, and texture, and comparing them with standard references. Proper identification of herbs is important to ensure the accuracy and reliability of the research work.[8]

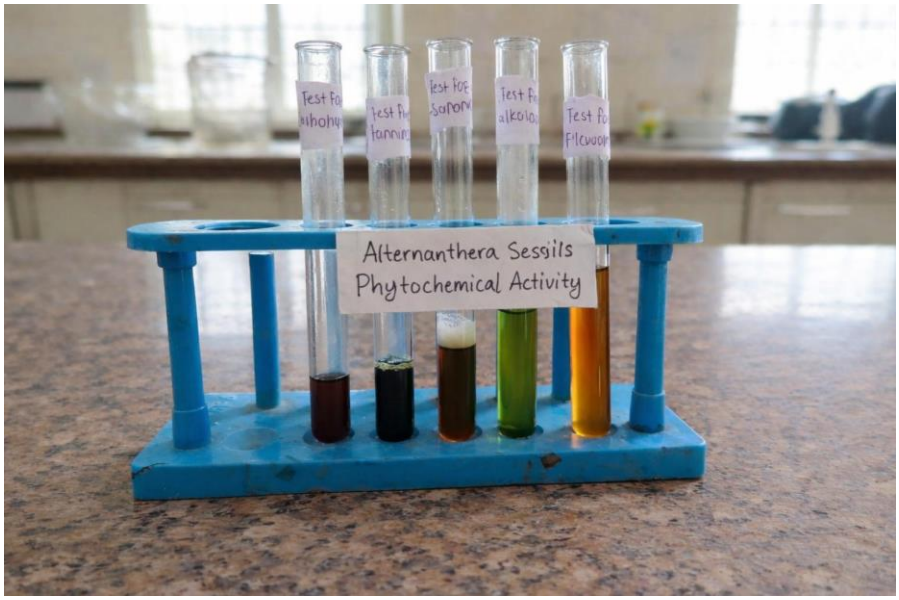


3. Preparation of Herbal Extract

After drying, the plant materials were ground into coarse powder using a grinder. The powdered herbs were then used for extraction using a suitable solvent such as water or ethanol.

For extraction, the powder was soaked in the solvent for about 24 to 72 hours with occasional stirring. After that, the mixture was filtered using filter paper to separate the extract. The obtained filtrate was then concentrated by evaporating the solvent using a water bath. Finally, the concentrated extract was stored in a closed container for further experimental use.[87]

Phytochemical Tests Alternanthera Sessilis



No.	Test Name	Test Procedure	Observation	Conclusion
1.	Test for Tannins	1 ml plant extract + 2 ml 5% ferric chloride	Dark blue or greenish black	Tannins are present
2.	Test for Saponins	2 ml plant extract + 2 ml distilled water, shaken for 15 minutes	1 cm layer of foam	Saponins are present
3.	Test for Carbohydrate	2 ml plant extract + 1 ml Molisch's reagent + few drops of conc. sulphuric acid	Purple or reddish colour	Carbohydrates are present
4.	Test for Flavonoids	2 ml plant extract + 1 ml of 2N sodium hydroxide	Yellow colour appeared	Flavonoids are present
5.	Test for Alkaloids	2 ml plant extract + 2 ml conc. hydrochloric acid + few drops of Mayer's reagent	Green colour or white precipitate	Alkaloids are present

Method of Preparation of Hair Serum

1. Take a clean beaker.
2. Add glycerin and propylene glycol and mix properly.
3. Add the prepared herbal extracts:

Neem extract
Hibiscus extract
Aloe vera gel
Curry leaves extract

4. Add Vitamin E as antioxidant.
5. Dissolve methyl paraben in a small quantity of warm water and add as preservative.
6. Add rose water or distilled water to make the final volume 100 ml.
7. Stir the mixture continuously using a magnetic stirrer or glass rod until a uniform serum is formed.
8. Check pH and viscosity.
9. Transfer the prepared serum into clean serum bottles.
10. Label the formulation (F1, F2, etc.).

FORMULA FOR 20ML

Ingredients	F1	F2	F3	Used
Hibiscus Extract	1.6ml	2ml	2.5ml	Hair growth & Conditioning
Neem Extract	0.6ml	1ml	1.2ml	Anti dandruff
Curry leaves Extract	0.6ml	1ml	1.2ml	Prevent hair fall
Aloe vera Gel	2.5ml	3ml	3.5ml	Moisturizer
Glycerin	1ml	1ml	1ml	Humectant
Propylene Glycol	0.5ml	0.8ml	1ml	Solvent
Methyl Paraben	0.04g	0.04g	0.04g	Preservative
Rose Water	q.s. to 20ml	q.s. to 20ml	q.s. to 20ml	Vehicle

Evaluation test for Hair Serum

1. Organoleptic Evaluation

The formulated hair serum was evaluated for its physical appearance such as color, odor, clarity, and texture. This helps in determining the acceptability of the product.

2. pH Determination

The pH of the hair serum was measured using a pH paper. The pH should be in the range of 4.5 to 6.5 to match the scalp pH and avoid irritation.

3. Viscosity

The viscosity of the serum was determined using a viscometer (Brookfield viscometer). This test indicates the flow property and consistency of the formulation.

4. Spreadability Test

A small amount of serum was placed between two glass slides and compressed to a uniform thickness. The ease with which the serum spreads was observed. Good spreadability ensures easy application on hair.

5. Homogeneity Test

The formulation was visually checked for uniformity. The serum should be free from lumps, aggregates, or phase separation.

6. Stability Study

The prepared serum was stored at different conditions such as room temperature and elevated temperature for a specific period. It was observed for any changes in color, odor, or phase separation.

7. Irritancy Test

The serum was applied on a small area of skin to check for any irritation, redness, or itching. A non-irritant formulation is considered safe for use.

8. Washability Test

The ease of removal of the serum from hair using water was evaluated. The serum should be easily washable without leaving residue.

RESULT AND DISCUSSION

1. Organoleptic Evaluation

Parameter	Result
Colour	Green
Odour	Characteristic
Apperance	Clear liquid
Texture	Non-greasy , Smooth

2. PH Determination

Sample pH value of Hair Serum formulation is pH ≈ 6
For a Hair serum the acceptable pH range is 4.5 - 6.5.

3. Spreadability Test

Formula Used

Spredability = (Weight × Length) / Time

Trial	Time (sec)	Spreadability
1	5	Good
2	6	Good
3	5	Good

The Serum Showed smooth spreading on the scalp.

4. Washability

Parameter	Observation
Ease of washing	Easily washable
Residue	Minimal

5. Irritancy test

Parmeter	Observation
Redness	Absent
Itching	Absent
Irritation	Non Observed

6. Stability Test
The formulation was stored at different conditions (room temperature and 40°C).

Observation
No change in colour
No phase separation
No change in odour

Result
The hair serum was found to be stable.

7. Viscosity Test
Determine the viscosity of prepared polyherbal hair serum formulations using Ostwald Viscometer.

Procedure
- The Ostwald viscometer was cleaned and dried properly.
- The prepared hair serum formulation was filled in the viscometer up to the marked Level.
- The sample was sucked above the upper mark using a rubber bulb.
- The time required for the serum to flow from upper mark to lower mark was noted Using a stopwatch.
- The procedure was repeated for all formulations (F1, F2, and F3) at room Temperature.

OBSERVATION

Formulation	Time of flow (sec)	Viscosity (Cp)
F1	52 sec	1.12 Cp
F2	58 sec	1.24 Cp
F3	64 sec	1.38 Cp

Result: Among all formulations, F3 showed higher viscosity compared to F1 and F2, Indicating better consistency and suitable flow property for hair application.

CONCLUSION
The present study successfully formulated and evaluated a polyherbal hair serum using natural ingredients such as neem, hibiscus, curry leaves, and aloe vera. The formulation showed good physicochemical properties, including suitable pH, viscosity, and spreadability, which indicate its compatibility with scalp and ease of application.[8]

The preliminary phytochemical screening confirmed the presence of important constituents like tannins, saponins, flavonoids, alkaloids, and carbohydrates, which are known for their beneficial effects on hair health. The evaluation tests demonstrated that the serum was stable, non-irritant, and easy to wash, making it safe and user-friendly.

Overall, the developed herbal hair serum can be considered an effective formulation for promoting hair growth, reducing hair fall, and improving hair texture. Further studies, including clinical evaluation, can be carried out to confirm its long-term efficacy.[8]

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