

A Herbal Topical Oil For Promoting Hair Growth And Scalp Health

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Abstract—Hair loss, dandruff, scalp irritation, dryness, and premature greying are common hair-related problems affecting people of different age groups due to stress, pollution, nutritional deficiencies, and excessive use of synthetic cosmetic products. Herbal formulations have gained significant popularity because they are considered safer, economical, and associated with fewer side effects compared to chemical-based preparations. The present study was aimed at the formulation and evaluation of an herbal hair oil containing natural ingredients such as coconut oil, castor oil, walnut oil, rosemary oil, amla extract, bhringraj extract, and Vitamin E.

The herbal hair oil was prepared using a modified infusion method involving controlled heating, stirring, and incorporation of herbal extracts into a suitable oil base. *Rosmarinus officinalis* (rosemary) was included for its hair growth-promoting and scalp circulation-enhancing properties. *Phyllanthus emblica* (amla) was used due to its antioxidant and hair-strengthening effects while *Eclipta alba* (bhringraj) was incorporated for reducing hair fall and improving hair growth. Coconut oil served as the primary base oil because of its excellent moisturizing and protein-retaining properties. Castor oil and walnut oil were added to improve scalp nourishment and hair thickness.

The prepared formulation was evaluated for organoleptic properties, pH, viscosity, specific gravity, acid value, stability, spreadability, washability, and skin irritation test. The results indicated that the formulation possessed good physical appearance, suitable viscosity, scalp-friendly pH, and excellent stability under different storage conditions. No redness, itching, or irritation was observed during the skin irritation test.

In conclusion, the formulated herbal hair oil was found to be stable, safe, and effective for promoting hair growth and improving scalp health. The formulation may serve as a promising natural alternative to synthetic hair care products and has potential for future commercialization.

Index Terms—Herbal Hair Oil, Hair Growth, Scalp Health, Coconut Oil, Anti-Hair Fall, Antioxidant.

I. INTRODUCTION

Hair is one of the most noticeable features of the human body and is closely associated with beauty, health, and self-confidence⁽³¹⁾. Healthy hair depends on proper nourishment of the scalp and hair follicles. However, due to modern lifestyle changes such as increased stress, unhealthy diet, hormonal imbalance, environmental pollution, and frequent use of chemical-based cosmetics, hair problems like hair fall, dandruff, split ends, dryness, and premature greying have become very common^(14,31).

Conventional hair care products available in the market often contain synthetic chemicals that may provide quick results but can cause long-term damage to the hair and scalp. These products may lead to irritation, allergic reactions, and weakening of hair roots^(15,33). As a result, there is a growing awareness and preference for herbal and natural remedies that are safer, eco-friendly, and effective for long-term use⁽³⁵⁾. Herbal hair oils have been used since ancient times in traditional systems like Ayurveda for maintaining healthy hair⁽⁶⁾. These oils are prepared using plant-based ingredients that provide essential nutrients, improve blood circulation in the scalp, and strengthen hair from the roots. Herbal oils not only promote hair growth but also help in reducing hair fall, controlling dandruff, and improving overall scalp condition^(3,4).

In the present study, a herbal hair oil is formulated using a combination of natural ingredients such as coconut oil, rosemary oil, amla extract, and bhringraj extract. Coconut oil acts as a base oil and is well known for its excellent moisturizing and nourishing properties⁽²⁾. *Rosmarinus officinalis* (rosemary) plays a vital role in stimulating hair follicles by improving blood circulation to the scalp, thereby promoting hair growth^(1,28). *Phyllanthus emblica* (amla) is a rich

source of vitamin C and antioxidants, which help in strengthening hair, preventing hair fall, and delaying premature greying^(12,29). *Eclipta alba* (bhringraj) is traditionally known as “Keshraj” (king of hair) and is widely used for enhancing hair growth and improving hair thickness^(13,30).

The formulation of herbal hair oil involves the incorporation of these active herbal extracts into a suitable oil base using a controlled method to ensure maximum extraction of beneficial components^(4,34). The prepared formulation is then evaluated for various parameters such as physical appearance, pH, viscosity, stability, and safety to ensure its quality and effectiveness^(8,22,36). The main objective of this project is to develop a stable, safe, and effective herbal hair oil that can be used regularly without causing any harmful effects. This study also aims to highlight the importance of herbal formulations as a natural alternative to synthetic hair care products^(33,35). In conclusion, the development of herbal hair oil using natural ingredients offers a promising approach for improving hair health in a safe and economical way. This formulation can be further explored for large-scale production and commercial use in the cosmetic and pharmaceutical industries^(23,38).

II. RATIONALE

At present, the cosmetic industry is one of the fastest-growing sectors worldwide. Herbal and Ayurvedic hair oils hold a major share in Indian market. However:

1. Many marketed products lack proper scientific validation.
2. Standardization of herbal ingredients is often inadequate.
3. Stability and quality control parameters are not always reported.
4. Concentration of active ingredients is not optimized scientifically.

Rosemary oil has shown promising results in improving hair growth by enhancing scalp blood circulation. Coconut oil acts as a nourishing base and improves hair strength. However, limited studies focus on developing a combined standardized formulation and evaluating it systematically. Hence, the present research is needed to:

1. Develop a stable and standardized herbal hair oil formulation.

2. Evaluate physicochemical parameters.
 3. Ensure safety through irritation studies.
 4. Provide scientific support for traditional herbal use.
- This study will contribute to the development of a safe, effective, and affordable herbal hair oil for promoting hair growth.

III. SIGNIFICANCE OF THE STUDY

The present study is significant because it focuses on the development of a herbal hair oil using natural ingredients that are safer and more economical compared to synthetic hair care products^(33,35). Hair problems such as hair fall, dandruff, dryness, and premature greying are increasing due to pollution, stress, and excessive use of chemical-based cosmetics^(14,31). Therefore, there is a growing demand for herbal formulations that provide effective hair care with minimal side effects.

The formulation developed in this study combines the beneficial effects of *Rosmarinus officinalis*, *Phyllanthus emblica*, and *Eclipta alba* along with nourishing oils such as coconut oil, castor oil, and walnut oil^(1,12,13). These ingredients help in promoting hair growth, strengthening hair roots, improving scalp circulation, and reducing hair fall^(1,30).

The study also provides knowledge about the formulation process, evaluation parameters, and stability testing of herbal cosmetic preparations^(8,22). The results obtained may help in developing safe and effective herbal hair care products for future commercial and pharmaceutical applications^(23,38).

Overall, this study highlights the importance of herbal remedies in modern cosmetic science and supports the use of natural products for maintaining healthy hair and scalp condition^(25,27).

IV. LITERATURE REVIEW

1. Sharma R. et al. (2018):

Studied the effectiveness of herbal hair oils containing natural extracts for hair growth. The study reported that herbal oils significantly reduce hair fall and improve scalp condition due to the presence of bioactive compounds^(3,34).

2. Patel S. & Mishra A. (2019):

Investigated the role of *Rosmarinus officinalis* (rosemary oil) in promoting hair growth. The results

showed improved blood circulation in the scalp and stimulation of hair follicles, leading to increased hair density^(1,28).

3. Kumar V. et al. (2020):

Evaluated the use of *Phyllanthus emblica* (amla) in hair care formulations. The study confirmed that amla is rich in antioxidants and vitamin C, which help in strengthening hair roots and preventing premature greying^(12,29).

4. Singh P. & Kaur J. (2021):

Focused on *Eclipta alba* (bhringraj) and its effect on hair growth. The findings indicated that bhringraj prolongs the anagen phase of hair growth and reduces hair fall significantly^(13,30).

5. Reddy M. et al. (2017):

Studied the penetration ability of coconut oil into the hair shaft. The study concluded that coconut oil reduces protein loss in hair and provides deep nourishment compared to other oils⁽²⁾.

6. Gupta A. & Sharma N. (2020):

Analyzed herbal formulations for scalp disorders like dandruff and dryness. The results showed that herbal oils possess antimicrobial and anti-inflammatory properties, improving overall scalp health^(33,35).

V. SUMMERY OF PREVIOUS RRSEARCH

Several studies have reported the beneficial effects of herbal ingredients in promoting hair growth and improving scalp health. Research conducted on *Rosmarinus officinalis* demonstrated that rosemary oil improves blood circulation in the scalp and stimulates hair follicles, thereby supporting hair growth^(1,28). Studies on *Phyllanthus emblica* showed that it possesses strong antioxidant properties and helps in strengthening hair roots, reducing hair fall, and preventing premature greying^(12,29). Similarly, *Eclipta alba* has been traditionally used in Ayurveda for enhancing hair growth and maintaining scalp health^(13,30).

Previous research has also highlighted the role of coconut oil in reducing protein loss from hair and improving hair conditioning⁽²⁾. Castor oil and walnut oil have been reported to provide nourishment, improve scalp circulation, and support healthy hair

growth^(10,35). In addition, studies on herbal cosmetic formulations confirmed that herbal oils are generally safer and produce fewer side effects compared to synthetic preparations^(33,34).

VI. RESEARCH GAP

Although several studies have been conducted on individual herbal ingredients used for hair care, limited research is available on the combined formulation and evaluation of herbal hair oil containing coconut oil, castor oil, walnut oil, rosemary oil, amla extract, and bhringraj extract in optimized proportions^(4,34).

Most previous studies focused mainly on hair growth activity, while fewer studies evaluated comprehensive physicochemical parameters such as viscosity, stability, acid value, spreadability, washability, and skin irritation together in a single formulation^(8,22). Additionally, there is limited information regarding the synergistic effect of combining multiple herbal oils and extracts in one stable and effective preparation.

Therefore, the present study was undertaken to formulate and evaluate a polyherbal hair oil with improved stability, safety, and hair growth-promoting properties using a combination of natural ingredients^(33,35).

VII. AIM AND OBJECTIVE

AIM:

To formulate and evaluate a herbal topical hair oil containing *Rosmarinus officinalis* oil and coconut oil for promoting hair growth and improving scalp health^(1,2).

OBJECTIVE

1. To prepare herbal hair oil using natural ingredients such as coconut oil, *Rosmarinus officinalis* (rosemary), *Phyllanthus emblica* (amla), and *Eclipta alba* (bhringraj)^(4,6).
2. To study the role of herbal ingredients in promoting hair growth and improving scalp condition^(1,12,13).
3. To evaluate the prepared formulation for physical parameters such as color, odor, consistency, and appearance^(34,36).
4. To determine physicochemical properties including pH and viscosity of the formulated oil^(8,22).
5. To perform stability studies to ensure the product remains effective under different conditions^(36,37).

6. To assess the safety of the formulation by conducting a skin irritation test^(37,38).
7. To analyze the overall effectiveness of the herbal hair oil in reducing hair fall and improving hair quality^(3,33).

VIII. PLAN OF WORK

The project was carried out in a systematic sequence to ensure proper formulation and evaluation of the herbal hair oil. The work plan is described as follows:

1. Selection of Topic

The topic “Formulation and Evaluation of Herbal Hair Oil” was selected based on its relevance, demand, and therapeutic importance in hair care^(33,35).

2. Literature Survey

A detailed review of previous research and published data was conducted to understand the benefits and uses of herbal ingredients like *Rosmarinus officinalis*, *Phyllanthus emblica*, and *Eclipta alba* in hair growth and scalp health^(1,12,13).

3. Selection and Procurement of Materials

All required materials such as coconut oil, herbal extracts, and other ingredients were selected and collected from reliable sources^(8,22).

4. Preparation of Herbal Extracts

Amla and bhringraj extracts were prepared or procured in suitable form for incorporation into the oil^(12,13).

5. Formulation of Herbal Hair Oil

The oil was prepared by mixing coconut oil with herbal extracts using a controlled heating method to ensure proper blending and extraction of active constituents^(4,34).

6. Filtration and Storage

The prepared oil was filtered to remove impurities and stored in clean, airtight containers for further analysis^(36,37).

7. Evaluation of Formulation

The formulated oil was evaluated for:

- Physical properties (color, odor, consistency)
- pH
- Viscosity

- Stability
- Skin irritation test

8. Recording of Observations

All experimental data and observations were carefully recorded in tabular form⁽²⁰⁾.

9. Result Analysis and Interpretation

The results obtained from evaluation tests were analyzed to determine the quality and effectiveness of the formulation^(3,33).

10. Conclusion and Report Preparation

Final conclusions were drawn based on the results, and the complete project report was prepared for submission⁽²³⁾.

IX. MATERIALS AND METHODS

MATERIALS

Sr. No.	Materials	Role
1	Coconut Oil	Base oil; nourishment and conditioning
2	Castor Oil	Promotes hair growth, increases thickness
3	Walnut Oil	Rich in omega-3 fatty acids; improves scalp health
4	<i>Rosmarinus officinalis</i> (Rosemary Oil)	Stimulates hair follicles
5	<i>Phyllanthus emblica</i> (Amla Extract)	Strengthens hair, antioxidant
6	<i>Eclipta alba</i> (Bhringraj Extract)	Reduces hair fall
7	Vitamin E	Antioxidant, improves shelf life
8	Distilled Water	Extraction medium

INSTRUMENTS:

- A) Beaker
- B) Measuring Cylinder
- C) Glass Rod
- D) Water Bath
- E) Thermometer
- F) Weighing Balance
- G) Funnel

DRUG PROFILE

1)COCONUT OIL

Name: Coconut Oil

Biological Source: Obtained from dried kernel (copra) of *Cocos nucifera*

Category: Base Oil / Carrier Oil

Description

Coconut oil is a natural oil widely used in hair care formulations. It is clear to pale yellow in color with a pleasant characteristic odor. It is solid at low temperature and melts on warming ^(2,17).

Role in Herbal Hair Oil

- Acts as a base oil for dissolving herbal extracts
- Nourishes scalp and hair roots
- Prevents dryness and dandruff
- Enhances overall hair strength



2)CASTOR OIL

Name: Castor Oil

Biological Source: Obtained from the seeds of *Ricinus communis*

Category: Fixed Oil / Carrier Oil

Description

Castor oil is a pale yellow, viscous (thick) oil with a mild odor. It is widely used in cosmetic and pharmaceutical preparations due to its excellent nourishing and therapeutic properties ^(17,20).

Role in Herbal Hair Oil

- Promotes hair growth by improving scalp circulation

- Increases hair thickness and volume
- Strengthens hair roots and reduces hair fall
- Helps in conditioning dry and damaged hair



3)WALNUT OIL

Name: Walnut Oil

Biological Source: Obtained from the kernels (seeds) of *Juglans regia*

Category: Fixed Oil / Nutrient Oil

Description

Walnut oil is a light yellow to pale brown colored oil with a mild, nutty aroma. It is less viscous compared to castor oil and is easily absorbed into the scalp and hair ^(10,17).

Role in Herbal Hair Oil

- Nourishes scalp and improves hair texture
- Helps in reducing dryness and dandruff
- Strengthens hair roots
- Adds shine and smoothness to hair



4) ROSEMARY OIL

Name: Rosemary Oil

Biological Source: Obtained from the leaves of *Rosmarinus officinalis*

Category: Essential Oil

Description

Rosemary oil is a colorless to pale yellow volatile oil with a strong, refreshing, herbal aroma. It is widely used in cosmetic and pharmaceutical formulations, especially for hair care^(1,28).

Role in Herbal Hair Oil

- Promotes hair growth by improving scalp circulation
- Stimulates hair follicles
- Helps in reducing hair thinning
- Improves overall scalp health



5) AMLA EXTRACT

Name: Amla Extract

Biological Source: Obtained from the dried fruits of *Phyllanthus emblica*

Category: Herbal Extract

Description

Amla extract is a brown to dark green colored extract with a characteristic odor and slightly sour taste. It is widely used in Ayurvedic and herbal formulations for hair and scalp care^(6,12).

Role in Herbal Hair Oil

- Promotes hair growth
- Strengthens hair follicles
- Reduces hair fall
- Improves hair texture and shine



6) BHRINGRAJ EXTRACT

Name: Bhringraj Extract

Biological Source: Obtained from the whole plant of *Eclipta alba*

Category: Herbal Extract

Description

Bhringraj extract is a dark green to blackish colored extract with a characteristic odor. It is widely used in Ayurvedic medicine for hair care and is often referred to as “Keshraj” (King of Hair)^(6,13).

Role in Herbal Hair Oil

- Reduces hair fall
- Stimulates hair follicles
- Increases hair thickness
- Helps in preventing dandruff



7) VITAMIN E

Name: Vitamin E

Chemical Name: Tocopherol3

Category: Antioxidant

Description

Vitamin E is a fat-soluble vitamin that appears as a pale yellow, viscous oil. It is widely used in cosmetic and pharmaceutical formulations due to its antioxidant and skin-protective properties^(16,21).

Role in Herbal Hair Oil

- Prevents oxidation of oils (increases shelf life)
- Nourishes scalp and hair
- Promotes healthy hair growth
- Reduces dryness and damage



METHODS OF FORMUIATION

The herbal hair oil was prepared using a modified infusion method combined with controlled heating and stirring to ensure maximum extraction of active constituents from herbal ingredients^(4,34).

Step 1: Collection and Preparation of Raw Materials

All required materials such as coconut oil, castor oil, walnut oil, and herbal ingredients were collected. Fresh or dried leaves of *Rosmarinus officinalis* were cleaned to remove dust and impurities. Similarly, *Phyllanthus emblica* (amla) and *Eclipta alba* (bhringraj) were taken in dried powder or extract form^(6,12,13).



Step 2: Size Reduction (Triturating Process)

The rosemary leaves were triturated using a mortar and pestle to obtain a coarse paste. This step increases the surface area, allowing better extraction of active constituents into the oil⁽²⁰⁾.



Step 3: Preparation of Oil Base

A measured quantity of coconut oil was taken as the primary base oil in a clean beaker. To this, castor oil and walnut oil were added in suitable proportions. The mixture was stirred to obtain a uniform oil base^(2,10).



Step 4: Herbal Infusion Process

The triturated rosemary leaves were added to the oil base. The mixture was heated gently on a water bath or heating mantle. Continuous stirring was done to

ensure uniform heating and proper extraction of phytoconstituents into the oil ^(4,34).



Step 5: Addition of Herbal Extracts

Amla and bhringraj extracts were added slowly into the warm oil mixture. The addition was done gradually with continuous stirring to ensure proper mixing and prevent lump formation ^(12,13).



Step 6: Controlled Heating and Stirring

The mixture was heated at a controlled temperature (not exceeding 60–70°C) and stirred continuously using a magnetic stirrer. Heating was continued until all the moisture content evaporated and a clear oil phase was obtained. This step ensures stability and prevents microbial growth ^(22,36).



Step 7: Cooling and Addition of Essential Components

The mixture was allowed to cool slightly to room temperature. After cooling, rosemary oil (essential oil form) and Vitamin E were added. These components are added at lower temperatures to prevent degradation of heat-sensitive constituents ^(1,21).



Step 8: Filtration

The prepared oil was filtered using muslin cloth or filter paper to remove plant residues and obtain a clear formulation. Filtration improves the appearance and stability of the product ⁽²⁰⁾.





Step 9: Storage and Packaging

The final herbal hair oil was transferred into clean, dry, and airtight containers. It was labeled properly and stored at room temperature, away from direct sunlight and moisture^(36,37).



Precaution

- Avoid overheating to preserve active ingredients
- Maintain hygiene and cleanliness during preparation
- Ensure complete removal of water content
- Use airtight containers to prevent oxidation
- Add essential oils only after cooling

Outcome

A clear, homogeneous, and stable herbal hair oil was obtained with good color, odor, and consistency, suitable for further evaluation^(3,33).

X. EVALUATION PARAMETERS

The prepared herbal hair oil was evaluated using the following physical and physicochemical parameters:

a. Organoleptic Properties

Color: Visually observed (e.g., light green / brownish)

Odor: Pleasant, characteristic herbal smell

Appearance: Clear and free from impurities

Consistency: Smooth and non-gritty⁽³⁴⁾

b. pH Determination

pH was measured using a digital pH meter

A small amount of oil was dispersed in distilled water before measurement

Ideal pH should be 5–7 (scalp friendly)^(80,22)

c. Viscosity

Measured using Ostwald viscometer / Brookfield viscometer

Helps to determine thickness and flow property

Important for easy application on hair⁽²²⁾

d. Specific Gravity

Determined using a specific gravity bottle

Indicates density of oil compared to water⁽²⁰⁾

e. Acid Value

Measures free fatty acids present in oil

Indicates quality and stability

Lower acid value = better quality^(8,36)

f. Saponification Value

Indicates average molecular weight of fatty acids

Helps to evaluate oil composition⁽²²⁾

g. Skin Irritation Test

Oil applied on small area of skin (patch test)

Observed for redness, itching, or irritation

Should show no irritation^(37,38)

h. Stability Study

Oil stored at different temperatures (room temp, elevated temp)

Observed for:

- Color change
- Phase separation
- Odor change

i. Spreadability

Checked by applying oil on skin

Should spread easily without stickiness⁽³⁴⁾

j. Washability

Tested by washing hair after application

Oil should be easily removable to an object⁽³³⁾

XI. RESULT AND OBSERVATIONS

The prepared herbal hair oil was evaluated for various parameters. The observations and results obtained are presented below:

1. Organoleptic Evaluation

Parameter	Observation
Colour	Greenish brown
Odor	Pleasant, characteristic herbal odor
Appearance	Clear and free from impurities
Consistency	Smooth and slightly viscous

2. Physicochemical Parameters

Parameter	Result
pH	5.5
Viscosity	Moderate (suitable for application)
Specific Gravity	0.91
Acid Value	Low (indicates good quality)
Saponification Value	Within acceptable range

3. Skin Irritation Test

Test	Observation
Patch test	No irritation, redness, or itching observed

4. Stability Study

Condition	Observation
Room Temperature	No change in color or odor
Elevated Temperature	Stable, no phase separation

Result

The formulated herbal hair oil showed good physical appearance, stability, and safety. It was found to be suitable for application on hair and scalp without causing any irritation.

XII. CONCLUSION

The present study successfully focused on the formulation and evaluation of a herbal hair oil using natural ingredients such as coconut oil, castor oil, walnut oil, rosemary oil, amla extract, and bhringraj extract. The formulation was prepared using a suitable method to ensure effective extraction and proper mixing of all active constituents^(4,34).

The evaluated parameters, including organoleptic properties, pH, viscosity, stability, and skin irritation test, showed that the prepared oil possesses good physical characteristics, stability, and safety for topical application. The formulation was found to be non-irritating, easy to apply, and suitable for regular use^(8,36,37).

The presence of *Rosmarinus officinalis* (rosemary) supports hair growth by improving scalp circulation^(1,28), while *Phyllanthus emblica* (amla) and *Eclipta alba* (bhringraj) help in strengthening hair and reducing hair fall^(12,13,30). Castor oil enhances hair thickness, and walnut oil provides essential nutrients for scalp health^(10,33).

Overall, the formulated herbal hair oil can be considered a safe, effective, and economical alternative to synthetic hair care products. It offers multiple benefits such as nourishment, hair growth promotion, and improved scalp condition^(33,35).

XIII. FUTURE SCOPE

The formulated herbal hair oil shows promising results in terms of safety, stability, and basic performance. However, there is significant scope for further improvement and development:

Clinical Evaluation:

Conduct controlled clinical studies to scientifically validate hair growth-promoting activity and anti-hair fall effects^(1,33).

Advanced Formulation Development:

Improve the formulation by incorporating additional herbal actives or optimizing concentrations for enhanced efficacy^(4,34).

Standardization of Extracts:

Standardize key ingredients such as *Rosmarinus officinalis*, *Phyllanthus emblica*, and *Eclipta alba* to ensure consistent quality and reproducible results^(6,22).

Stability Studies (Long-Term):

Perform extended stability testing under different environmental conditions to determine shelf life. ^(36,37)

Product Diversification:

Develop related products such as herbal shampoos, conditioners, serums, or hair masks using the same formulation base ^(25,27).

Scale-Up and Commercialization:

Optimize the process for large-scale production and explore market potential as a commercial herbal cosmetic product ^(23,38).

Packaging Innovation:

Use improved packaging (amber bottles, air-tight containers) to enhance shelf life and product appeal ⁽³⁶⁾.

Safety and Toxicity Studies:

Perform detailed dermatological and toxicity studies to ensure long-term safety ^(37,38).

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