

FORMULATION AND EVALUATION OF HERBAL HAIR OIL**Sumit Dilip Nanhe*, Neha Gajanan Raut, Associate Prof. Azam Khan,****Dr. Rahul Bijwar Sir**

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834-851.This work is licensed under Creative Commons
Attribution 4.0 International license.**ABSTRACT**

Herbal hair oil formulations have gained significant attention due to their therapeutic benefits and reduced side effects compared to synthetic hair care products. The present study was aimed at the formulation and evaluation of a polyherbal hair oil using natural ingredients traditionally known for promoting hair growth and maintaining scalp health. The formulation contained Amla, Neem, Hibiscus, curry leaves, fenugreek seeds, aloe vera gel, clove, lavender oil, and coconut oil as the base. These ingredients possess properties such as anti-dandruff activity, hair growth promotion, scalp nourishment. The herbal hair oil was prepared using the heating and maceration method and evaluated for various physicochemical and organoleptic parameters including colour, odour, appearance, pH, viscosity, specific gravity, spreadability, irritation test, and

stability studies. The prepared formulation showed satisfactory physical appearance, good stability, acceptable pH, and no signs of skin irritation. The formulation also demonstrated good homogeneity and enhanced conditioning properties. hment, antimicrobial action, and conditioning effects.

KEYWORDS: Herbal hair oil, Scalp nourishment, Herbal formulation, Coconut oil, Amla, Neem, Fenugreek, Hibiscus, Aloe vera, Hair fall control, Natural cosmetics, Hair care, Stability evaluation.

INTRODUCTION

Hair plays an important role in human life. In India the traditional process is the preparation of hair oils put together with various hair growth promoting drugs. Indian women are known

for their long, shiny and healthy hair, so it is not surprising that hair care features prominently in their self-care rituals. The Charaka Samhitha (the definitive book on Ayurvedic medicine) describes the importance of oiling the hair and scalp to maintain good hair health and prevent hair loss. The daily hair oiling was recommended with appropriate herbs filled to suit others constituents and this practice also continuous until today. The hair oil preparations are included to treat various dandruff, hair fall process, split ends etc. The hair oil preparations are mainly used to cool the scalp for luxurious growth of hair in both men and women.^[1] Various type of Oils like Almond oil, castor oil, onion oil are applied to scalp in admixture with suitable herbal drugs. Among these oils coconut oil is the foremost worthy oil base because it gets absorbed into the hair strands better than other oils and also economical compared to other oils. Hence coconut oil added with herbal drugs is mentioned method for best hair growth.^[2]

SCALP

The scalp is the soft tissue covering the top of the human skull. It protects the skull and brain while also supporting hair growth. The scalp is made up of five main layers: skin, connective tissue, the aponeurosis (a tough fibrous layer), loose connective tissue, and the pericranium. These layers work together to provide cushioning, blood supply, and flexibility. The scalp contains thousands of hair follicles, sebaceous (oil) glands, sweat glands, nerves, and blood vessels, making it one of the most richly supplied areas of the body.^[7]

The skin of the scalp is thicker than skin on many other parts of the body because it contains numerous hair follicles and glands. Sebaceous glands produce sebum, an oily substance that helps moisturize the hair and scalp. Sweat glands help regulate body temperature by releasing sweat. Because of its rich blood supply, cuts on the scalp often bleed heavily even when they are small. Hair growth begins in the scalp's hair follicles. Each hair grows in a cycle that includes a growth phase (anagen), a resting phase (telogen), and a shedding phase. Healthy scalp conditions are important for strong and healthy hair. Problems such as dandruff, dryness, excessive oiliness, fungal infections, lice, psoriasis, and eczema can affect the scalp and may lead to itching, irritation, or hair loss.^[8]

STRUCTURE OF HAIR

Hair Shaft

The hair shaft is the visible part of the hair that projects above the surface of the skin. It is made up of dead keratinized cells and consists of three layers: the cuticle, cortex, and

medulla. The cuticle forms the outer protective covering, the cortex provides strength and colour, and the medulla is the inner core. The hair shaft protects the scalp and contributes to appearance.

Hair Follicle

The hair follicle is a tube-like structure present in the skin from which hair grows. It surrounds the hair root and supports hair formation and growth. The follicle is associated with sebaceous glands that produce oil and the arrector pili muscle that causes goosebumps. It provides nutrients and protection necessary for healthy hair growth.^[7]

Hair Root

The hair root is the part of the hair located below the skin surface. It is embedded inside the hair follicle and anchors the hair firmly in the skin. The lower end of the root expands to form the hair bulb, which contains actively dividing cells responsible for hair growth. The root receives nourishment from blood vessels through the dermal papilla.^[8]

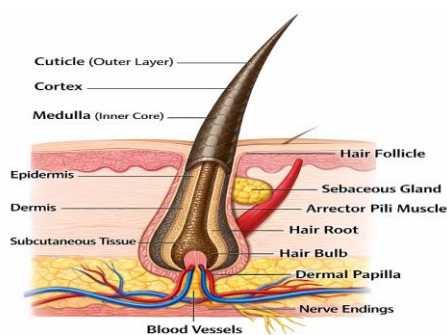


Fig No.1: Structure Of Hair.

Function of Hair

- Protects the scalp from sunlight and injuries
- Helps regulate body temperature
- Reduces heat loss from the body
- Contributes to appearance and personality.^[7,8]

Phases of Hair^[21]

- **Anagen (Growth Phase)**

The active phase where hair grows roughly 0.35 mm daily, lasting two to eight times.

- **Catagen (Transition Phase)**

A brief period of about two weeks where the hair follicle shrinks and detaches from the dermal papilla, marking the end of active growth.

- **Telogen (Resting Phase)**

A resting phase lasting a numerous month, during which hair growth ceases, and follicles remain dormant.

- **Exogen (slipping Phase)**

The phase where old hairs are slip to make way for new growth. Understanding the intricate structure and function of hair follicles is essential for addressing hair- related enterprises and promoting overall crown and hair health.

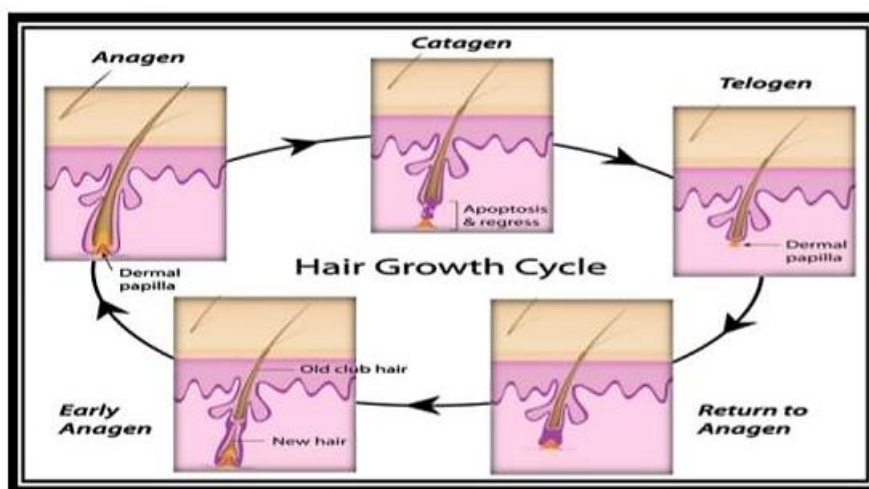


Fig No. 2 Hair Growth Cycle.

HAIR DISEASE

Hair loss is a widespread problem worldwide and affects both men and women. Women may notice significant hair thinning in their 40s and 50s, while men may notice hair loss for the first time as early as their 20s.^[23]

1. Androgenic alopecia
2. Alopecia Areata
3. Traction Alopecia

HAIR OIL

Hair oils are hair care product. Hair care product are defined as expression used to clean, restructure, nourish and maintain the healthy appearance of hair. Hair oil painting oil is

hair care product used to condition hair. Hair for hair conditions analogous as baldness graying of hair, hair loss, and dry hair and also helps to nourish hair. Herbal cosmetics are in demand due to adding interest of humanity and herbal cosmetic are also more effective with numerous side goods and element are readily available. Herbal hair oil painting oil is an important part of herbal dress. Herbal oil painting oil is preferred and is used in multitudinous hair salons. They not only promote hair growth, but also provide the necessary moisture to the crown, making hair beautiful. Legume oils containing herbal medicines are known as hair mixers Legume oil painting oil contains several essential nutrients that are important for hair care. Promotes natural hair growth. They are one of the most well-known hair care products. The use of hair oil painting oil increases every day with the improvement of people's living morals. To give hair oil painting painting natural flavours and colours, herbal essences and scents are added to it.^[24]

Benefits of Herbal Hair Oils

- **Promote Hair Growth:** Ingredients like rosemary and ginseng are known to stimulate blood circulation to the scalp, encouraging hair follicle activity and promoting growth.
- **Strengthen Hair:** Oils containing amla and bhringraj are rich in vitamins and minerals that nourish hair follicles, reduce hair breakage, and enhance hair strength.
- **Improve Scalp Health:** Tea tree and neem oils have antifungal and antibacterial properties, helping to maintain a healthy scalp and prevent dandruff.
- **Enhance Shine and Texture:** Almond and argon oils are known to add shine, reduce frizz, and improve the overall texture of the hair.

DRUG PROFILE

1. FENUGREEK SEED

Synonym: Trigonella, Greek clover, Trigonella foenumgraecum, Methi dana.

Biological source: It consist of dried ripe seeds of Trigonella foenum graecum plantplant.

Family: Fabaceae.

Chemical composition: Flavanol glycosides found in fenugreek include the alkaloid and volatile compound present are the two main chemical constituents that cause the bitter taste and the odour of the seeds. The major constituents that are present in fenugreek seeds are carbohydrates, proteins, lipids, alkaloids, saponins, vitamins, fibres and minerals.^[11]



Fig No. 3: Fenugreek Seed.^[11]

Uses

- Fenugreek hair oil helps lessen dandruff and increases blood circulation.
- Fenugreek seeds, known for their ability to combat dandruff and hair loss, are high in protein and nicotinic acid.
- It also addresses hair thinning, balding, and dryness.^[11]

2. CURRY LEAVES

Synonym: Curry leaves, sweet neem leaves

Biological source: It consists of dried leaves of *Murraya koenigii* Linn.

Family: Rutaceae

Chemical constituents: Curry leaves contain alkaloids, flavonoids, glycosides, tannins, carbohydrates, proteins, fibres, calcium, iron, phosphorus, vitamins A, B, C, and essential oils.^[14]



Fig No. 4: Curry Leaves.^[14]

Uses

- Curry leaves help promote hair growth and reduce hair fall.
- They prevent premature greying of hair.
- They nourish the scalp and strengthen hair roots.
- Curry leaves possess antioxidant and antimicrobial properties.
- They are also used to improve digestion and overall health.^[14]

3. NEEM LEAVES

Synonym: Neem leaves, Indian Lilac.

Biological source: It consists of dried leaves of *Azadirachta indica* A. Juss.

Family: Meliaceae.

Chemical constituents: Neem leaves contain nimbin, nimbidin, azadirachtin, flavonoids, tannins, glycosides, essential oils, proteins, carbohydrates, calcium, and vitamins.^[15]



Fig No. 5 Neem Leaves.^[15]

Uses

- Neem leaves possess strong antibacterial and antifungal properties.
- They help reduce dandruff and scalp infections.
- Neem promotes healthy hair growth and reduces hair fall.
- It helps cleanse the scalp and controls excess oil.
- Neem is also used in skin care and blood purification preparations.^[15]

4. AMLA POWDER

Synonym: Amla, Indian Gooseberry, Amalaki

Biological source: It consists of dried fruits of *Phyllanthus emblica* Linn. (or *Emblica officinalis*).

Family: Phyllanthaceae

Chemical constituents: Amla contains Vitamin C, tannins, gallic acid, ellagic acid, emblicanin A & B, flavonoids, pectin, carbohydrates, proteins, fibres, and minerals.^[11]



Fig No. 6: Amla Powder.^[11]

Uses

- Amla helps promote hair growth and prevents premature greying.
- It reduces dandruff and strengthens hair roots.
- Amla acts as a natural antioxidant and boosts immunity.
- It improves digestion and supports liver health.
- It is useful in cough, cold, and skin care preparations.^[11]

5. SHIKAKAI POWDER

Synonym: Shikakai, Soap Pod

Biological source: It consists of dried pods of *Acacia concinna* Linn.

Family: Fabaceae

Chemical constituents: Shikakai contains saponins, alkaloids, tannins, flavonoids, oxalic acid, citric acid, vitamins, and natural cleansing agents.^[13]



fig no. 7 shikakai powder.^[13]

Uses

- Shikakai is used as a natural hair cleanser.
- It promotes hair growth and strengthens hair roots.
- It helps reduce dandruff and scalp dryness.
- It makes hair soft, shiny, and manageable.
- It prevents hair fall and maintains healthy scalp condition.^[13]

6. HIBISCUS LEAVES OR FLOWER

Synonym: Hibiscus leaves, China rose leaves

Biological source: It consists of dried leaves of *Hibiscus rosa-sinensis* Linn

Family: Malvaceae

Chemical constituents: Hibiscus leaves contain flavonoids, mucilage, tannins, saponins, glycosides, calcium, phosphorus, iron, vitamins, and antioxidants.^[16]



Fig No. 8: Hibiscus Leaves.^[16]

Uses

- Hibiscus leaves help promote hair growth and strengthen hair roots.
- They help reduce dandruff and prevent hair fall.
- Hibiscus nourishes the scalp and conditions the hair naturally.
- It helps prevent premature greying of hair.
- Hibiscus leaves are also used for skin care and wound healing preparations.^[16]

7. CLOVE POWDER

Synonym: Clove, Lavang

Biological source: It consists of dried flower buds of *Syzygium aromaticum* Linn.

Family: Myrtaceae

Chemical constituents: Clove contains eugenol, eugenyl acetate, tannins, flavonoids, triterpenoids, carbohydrates, proteins, fibers, and essential oils.^[17]



Fig No. 9 Clove.^[17]

Uses

- Clove possesses strong antimicrobial and antiseptic properties.
- It helps improve scalp health and reduces dandruff.
- Clove stimulates blood circulation and promotes hair growth.
- It strengthens hair roots and reduces hair fall.
- Clove is also used in dental care, pain relief, and digestive preparations.^[17]

8. ALOE VERA

Synonym: Aloe vera, Ghritkumari

Biological source: It consists of dried gel or leaves of *Aloe barbadensis* Mill.

Family: Asphodelaceae

Chemical constituents: Aloe vera contains aloin, aloe-emodin, anthraquinones, polysaccharides, enzymes, amino acids, minerals, saponins, and lignin.^[18]



Fig No. 10: Aloe Vera.^[18]

Uses

- Aloe vera helps moisturize and nourish the scalp.
- It promotes healthy hair growth and reduces hair fall.
- Aloe vera helps reduce dandruff and scalp irritation.
- It conditions hair naturally and improves hair texture.

- Aloe vera is also widely used in skin care, wound healing, and cosmetic preparations.^[18]

9. COCONUT OIL

Synonym: Coconut oil, Narikel taila

Biological source: It is obtained from dried kernels (copra) of *Cocos nucifera* Linn.

Family: Arecaceae

Chemical constituents: Coconut oil contains lauric acid, capric acid, caprylic acid, myristic acid, palmitic acid, oleic acid, vitamins, antioxidants, and fatty acids.^[19]



Fig No. 11: Coconut Oil.^[19]

Uses

- Coconut oil nourishes and moisturizes the scalp and hair.
- It helps strengthen hair roots and reduce hair fall.
- Coconut oil prevents dryness and improves hair texture.
- It helps reduce dandruff and protects hair from damage.
- Coconut oil is also used in skin care, massage, and cosmetic preparations.^[19]

PROCEDURE

1) Take the required quantity of Coconut oil in a clean beaker.

2) Add powdered and fresh herbal ingredients such as.

- Aloe vera gel
- Amla powder
- Neem leaves
- Curry leaves
- Clove

- Hibiscus flowers/leaves
 - Coconut Oil
 - Lavender Oil
- 3) Heat the mixture gently on a water bath for about 30–45 minutes.
 - 4) Stir continuously using a glass rod to ensure proper mixing.
 - 5) Continue heating until the herbal extracts are transferred into the oil.
 - 6) Allow the prepared oil to cool at room temperature.
 - 7) Filter the oil using muslin cloth or filter paper to remove solid particles.
 - 8) Add a few drops of lavender oil for fragrance if required.
 - 9) Transfer the filtered oil into a clean, dry, airtight bottle.
 - 10) Label and store the herbal hair oil in a cool and dry place.

COMPOSITION OF FORMULATION

Table No. 1: Formulation of Hair Oil.

| Sr. No. | Ingredients | F1 | F2 | F3 | F4 |
|---------|---------------------------|------------|------------|------------|------------|
| 1 | Fenugreek seed | 0.30 gm | 0.30 gm | 0.30 gm | 0.30 gm |
| 2 | Curry leaves | 0.2 gm | 0.2 gm | 0.2 gm | 0.2 gm |
| 3 | Neem leaves | 0.08 gm | 0.2 gm | 0.2 gm | 0.3 gm |
| 4 | Amla powder | 0.3 gm | 0.2 gm | 0.4 gm | 0.3 gm |
| 5 | Shikakai powder | 0.5 gm | 0.3 gm | 0.2 gm | 0.2 gm |
| 6 | Hibiscus leaves or flower | 1-2 leaves | 2-3 leaves | 1-2 leaves | 2-3 leaves |
| 7 | Clove powder | 0.10 gm | 0.1 gm | 0.1 gm | 0.05 gm |
| 8 | Aloe vera | 2 gm | 1gm | 1.5 gm | 0.8 gm |
| 9 | Coconut oil | 8 ml | 7 ml | 6.5 ml | 7.5 ml |
| 10 | Lavender oil | 2-3 drops | 2-3 drops | 3-4 drops | 2-3 drops |



Fig No. 13: Formulation of Hair Oil Batch F1 – F4.

Application of Herbal Hair Oil

- Promotes hair growth
- Reduces hair fall
- Prevents dandruff and scalp infection
- Nourishes and strengthens hair roots
- Provides shine and smoothness to hair
- Helps in preventing premature greying
- Moisturizes dry scalp and hair
- Improves blood circulation of the scalp

Storage Condition of Herbal Hair Oil

- Store in a cool and dry place.
- Keep away from direct sunlight and heat.
- Store in a tightly closed container .
- Avoid contamination by keeping the cap closed after use.
- Keep away from moisture and dust.
- Recommended storage temperature: Below 25°C.

Evaluation Tests for Herbal Hair Oil

1) Physical Evaluation

- Colour
- Odor
- Appearance
- Texture – Smooth

2) pH Determination

The pH of the herbal oil was detected using pH meter.

3) Skin Irritation Test

The prepared herbal oil was applied on 1 cm skin of hand and exposed to sunlight for 4-5 min.

4) Wash ability

After applying herbal oil to the hair was washed with tap water.

5) Sedimentation

Keep the whole preparation aside for overnight and check for sedimentation occur in oil.

6) Stability study

It is performed by keeping the prepared herbal hair oil in a close container at cooled.

EVALUATION PARAMETER**Table No. 2: Physical Evaluation.**

| Sr. No. | Formulation | Colour | Odour | Texture | Appearance |
|---------|-------------|-------------------------------|---------------|------------|------------------------|
| 1 | F1 | Dark Greenish Brown | Pleasant | Non-sticky | Smooth |
| 2 | F2 | Slight Greenish | Mild Aromatic | Non-sticky | Smooth |
| 3 | F3 | Slight Yellow | Pleasant | Sticky | Homogeneous |
| 4 | F4 | Slight Yellowish and Greenish | Pleasant | Non-sticky | Smooth and Homogeneous |

Table No. 3: pH Determination.

| Sr. No. | Formulation | PH | Observation |
|---------|-------------|-----|-------------|
| 1 | F1 | 6.2 | Pass |
| 2 | F2 | 6.0 | Pass |
| 3 | F3 | 6.1 | Pass |
| 4 | F4 | 6.2 | Pass |

Table No. 4: Skin Irritation Test.

| Sr. No. | Formulation | Irritation |
|---------|-------------|---------------|
| 1 | F1 | Irritation |
| 2 | F2 | No irritation |
| 3 | F3 | Irritation |
| 4 | F4 | No irritation |

Table No. 5: Wash ability.

| Sr. No. | Formulation | Wash ability |
|---------|-------------|-----------------|
| 1 | F1 | Washable |
| 2 | F2 | Easily Washable |
| 3 | F3 | Washable |
| 4 | F4 | Easily Washable |

Table No. 6: Sedimentation.

| Sr. No. | Formulation | Observation |
|---------|-------------|---------------------------|
| 1 | F1 | No Sedimentation |
| 2 | F2 | Slight Sedimentation |
| 3 | F3 | Very Slight Sedimentation |
| 4 | F4 | No Sedimentation |

Table No. 7: Stability study.

| Sr. No. | Formulation | Observation |
|---------|-------------|-------------|
| 1 | F1 | Stable |
| 2 | F2 | Unstable |
| 3 | F3 | Unstable |
| 4 | F4 | More Stable |

RESULT

The evaluation of the four herbal hair oil formulations revealed that Formulation 4 (F4) achieved the best overall results. This specific formulation presented a smooth, homogeneous, non-sticky texture with a pleasant odour and a slight yellowish-green appearance. Crucially, F4 passed the pH determination test with a safe value of 6.2, caused absolutely no skin irritation, was easily washable from the hair, and exhibited no sedimentation after sitting overnight. Furthermore, the stability study confirmed that F4 was the most stable formulation among all those tested.

In comparison, the other formulations fell short in several key areas. While Formulation 2 (F2) was also non-irritating and easily washable, it proved to be unstable and developed slight sedimentation over time. On the other hand, Formulation 1 (F1) and Formulation 3 (F3) both failed the skin irritation test and were found to be more difficult to wash out of the hair. All four variations successfully maintained a safe, slightly acidic pH range between 6.0 and 6.2. Ultimately, the study concludes that a successful blend like F4 delivers a safe, high-quality cosmetic treatment that effectively channels the nourishing vitamins, minerals, and essential oils of its herbal ingredients to prevent hair fall and promote healthy hair growth.

CONCLUSION

The used of herbal hair oil in the cosmetic increases many folds in personal hygiene and health care system. Hair is one of the most recognized hair treatments. The use of different herbal materials which is having different benefits with good combination will give the great effect for enhance hair growth activity. It provides numerous essential nutrients required to maintain normal function of sebaceous gland and promote natural hair growth. The use of different benefits with good combination will give the great effect for hair. The herbal extracts and constituents chosen for formulation of hair oil were reported to have hair growth, it is use in treatment of alopecia areata scalps blood circulation. Thickening of hair, reduces excess illness, anti-dandruff and shiny hair growth. The formulation was proven to be safe for human use. Hair oil formulation with good values of evaluation parameters show similar

beneficial in maintaining good hair growth of the hair turning grey hairs to black providing protection from dandruff and results lustrous looking hairs. Formulation was done and evaluated by means of various parameters like pH greenish brown organoleptic properties (colour, odour, sedimentation) acid value, viscosity, saponification value, skin irritation test, volunteer study. At last, it can be concluded that the herbal oil formulation has significant quality. The formulated herbal oil provides many nourishing values to hair such as vitamins, minerals and essential oils.

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