WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 14, Issue 8, 1343-1369. Research Article ISSN 2277–7105

HERBAL HAIR OIL: A NOVEL FORMULATION FOR HAIR CARE AND MANAGEMENT

[1]Ashwini Dilip Kale, [*2]Pooja Dadarao Gayake, [*3]Mahesh Gajanan Farkade, [4]Suraj Eknath Gavali, [5]Saurabh Ganesh Gaware and [6]Dr. D. K. Vir

[1]Assistant Professor, [2]Student, [3]Student, [4]Student, [5]Student, [6]Principal

[1]Department of Pharmaceutical Science,

[1]Shree Goraksha College of Pharmacy and Research Center, Chhatrapati Sambhaji Nagar, India.

Article Received on
05 March 2025,

Revised on 25 March 2025,
Accepted on 15 April 2025

DOI: 10.20959/wjpr20258-36401

***Corresponding Author**
Pooja Dadarao Gayake
Student, Department of Pharmaceutical Science, Shree Goraksha College of Pharmacy and Research Center, Chhatrapati Sambhaji Nagar, India.
poojagayake57@gmail.com

ABSTRACT

Hair loss is a prevalent concern among both men and women, with issues such as thinning, dandruff, and hair fall commonly linked to this condition. While synthetic medications are available to address these concerns, they often come with adverse side effects such as burning, itching, dizziness, and dermatological reactions. These synthetic treatments may also fail to provide permanent relief, highlighting the need for safer, long-term alternatives. This study explores the development of a herbal hair oil formulated using natural ingredients, including hibiscus, Amla, shikakai, fenugreek seeds, coconut oil, almond oil, and neem oil, to address common hair-related issues. The goal was to create a safe, effective, and holistic solution to promote hair growth, strengthen hair follicles, improve scalp health, and moisturize the hair, without the negative side effects associated with synthetic products. Hibiscus is known for its follicle-strengthening properties, amla for its ability to support scalp health, and coconut oil for its moisturizing and conditioning effects. Preliminary results suggest that the herbal hair oil is a promising natural alternative, offering a gentle yet effective approach to hair care. This research advocates for the use of plant-derived ingredients in personal care products, emphasizing their potential in promoting healthier hair. Further studies are necessary to validate these findings and explore the full therapeutic potential of the herbal hair oil formulation.

KEYWORDS: Herbal hair oil, Herbs, Formulation & Evaluation, hair growth.

2. INTRODUCTION

Hair care plays a pivotal role in maintaining overall health and well-being, with particular emphasis on the nourishment and preservation of hair. In India, the practice of incorporating herbal remedies into hair care routines has been a long-standing tradition, deeply rooted in the ancient wisdom of Ayurvedic medicine. According to the *Charka Samhita*, an authoritative text on Ayurveda, regular oiling of the scalp and hair is essential to prevent hair loss and promote healthy hair growth. This practice, which involves the use of various herbal-infused oils, has remained prevalent across generations and continues to be an integral aspect of self-care among Indian women, renowned for their long, healthy, and lustrous hair.

The formulation of hair oils, particularly those infused with herbs like castor, coconut, almond, and onion oils is designed to address common hair issues such as split ends, dandruff, and hair thinning. Among these oils, coconut oil stands out due to its ability to effectively penetrate hair strands and deliver nourishment, making it an ideal base for herbal blends aimed at stimulating hair growth. The therapeutic benefits of these oils are believed to be enhanced through their cooling properties, which not only promote hair growth but also support the health of the scalp.

In modern times, herbal hair care products, including hair oils, have gained significant popularity due to their natural composition, minimal side effects, and superior efficacy compared to synthetic alternatives. Herbal oils, often combined with additional medicinal herbs, offer an all-encompassing solution for maintaining healthy hair by providing essential moisture and nutrients that support the regular function of the sebaceous glands. These oils are not only effective in promoting hair growth but also in restoring vitality and shine to the hair.[3]

Increasing demand for herbal cosmetics, driven by their natural and accessible ingredients, has led to the widespread use of herbal hair oils as a preferred choice for addressing various hair conditions. With the rise in living standards and growing awareness about the benefits of natural products, the formulation and evaluation of herbal hair oils has become a key area of focus in cosmetic science. This study aims to explore the development and therapeutic potential of herbal hair oils, specifically targeting their efficacy in improving hair growth and overall hair health.

2.1 Hair Follicle & Hair Structure

A hair follicle is a dynamic, complex organ bedded within the skin that produces hair. Understanding its structure offers perceptivity into hair growth, health, and the factors impacting hair loss.

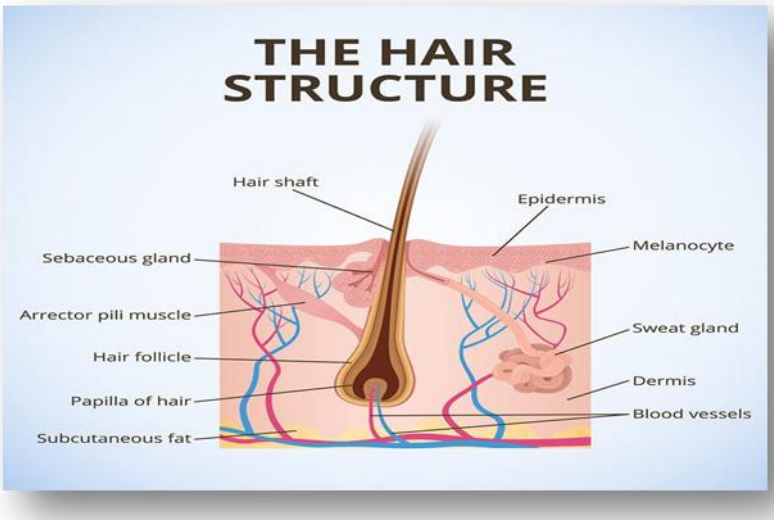

Fig No:-1 Structure of Hair.

2.2 Key Components of a Hair Follicle

- **Hair Shaft**

Cuticle: - The outermost caste composed of lapping keratinized cells, furnishing protection and contributing to the hair's shine.

Cortex:-Located beneath the cuticle, this thick caste contains keratin and melanin, determining the hair's strength, elasticity, and colour.

Medulla:-The central core, present mainly in thicker hairs, contributing to the hair's structure.

- **Hair Root and Bulb**

Bulb:-The bulbous base of the follicle where hair product begins, containing keratin-producing cells and melanocytes responsible for hair color.

- **Dermal Papilla**

A cone- shaped structure at the follicle's base, rich in blood vessels, furnishing essential nutrients and oxygen to support active hair growth.

- **Inner and external Root capsules**

Inner Root Sheath (IRS):-Attendants the growing hair shaft, icing it maintains its shape.

External Root Sheath (ORS):-Extends through the epidermis and dermis, sacrifice structural support and containing stem cells vital for hair regeneration and skin form.

- **Sebaceous Gland**

Connected to the follicle, this gland produces sebum, an oleaginous substance that conditions the crown and hair, preventing emptiness.

- **Arrector Pili Muscle**

A small smooth muscle attached to the follicle; its contraction causes the hair to stand upright (piloerection), generally known as" goosebumps."

2.3 Hair Growth Cycle

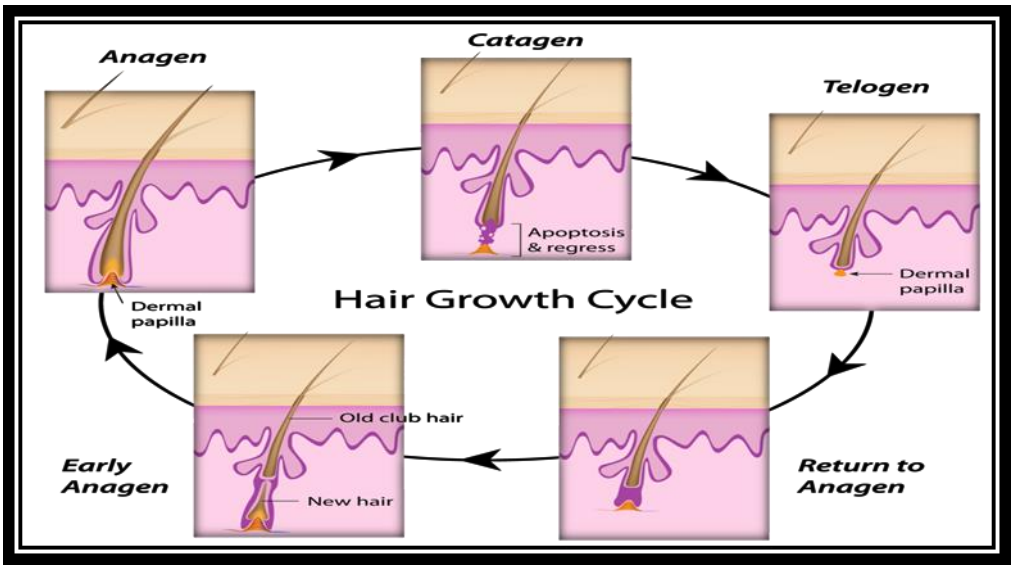

Fig.No. 2 Hair Growth Cycle.

2.4 Hair Follicles Suffer a Cyclical Process Comprising Four Stages

- **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 months, 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.

2.5 Types of Hair

Human hair is categorized based on its texture, which refers to the natural pattern of the hair strands. Understanding your hair type aids in selecting suitable care and styling methods. The primary hair types are.[7]

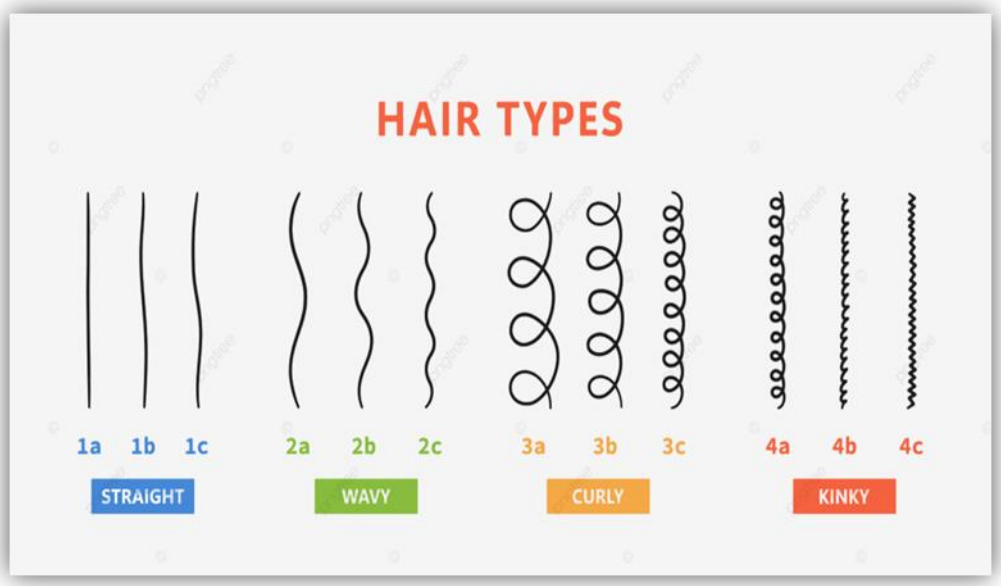

Fig. No. 3: Hair Types.

The classification of hair textures is a complex system that categorizes hair into four primary types: straight, wavy, curly, and coily. Each type is further subdivided into subcategories based on distinct characteristics.

Type 1: Straight Hair

Straight hair is characterized by its flat, smooth texture, which lies close to the scalp. This hair type tends to be oily due to the ease with which sebum travels down the hair shaft.

Type 1A: Fine, straight hair with minimal volume.

Type 1B: Straight hair with moderate volume and body.

Type 1C: Thick, coarse straight hair prone to frizz.

Type 2: Wavy Hair

Wavy hair exhibits a gentle "S" shape, offering a balance between straight and curly textures. This hair type can be prone to frizz, particularly in humid environments.

Type 2A: Loose, beachy waves with a fine texture.

Type 2B: Waves with defined texture and moderate frizz.

Type 2C: Thicker waves with increased frizz and volume

Type 3: Curly Hair

Curly hair is distinguished by its defined curls, which vary in size. This hair type tends to be drier due to the difficulty of natural oils traveling down the twists and turns of the hair shaft.

Type 3A: Loose, large curls with a soft texture.

Type 3B: Tighter curls with increased volume and frizz.

Type 3C: Kinky, dense curls with a thick, full texture.

Type 4: Coily Hair

Coily hair is characterized by its very tight curls or zigzag patterns. This hair type is the most fragile and requires gentle care to prevent breakage.

Type 4A: Soft, defined coils with a visible curl pattern.

Type 4B: Z-shaped, less defined coils with a cotton-like texture.

Type 4C: Tightly coiled, almost no defined curl pattern, and extremely fragile.

2.6 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.[8]

1. Andrognic alopecia
2. Alopecia Areata
3. Traction Alopenia
4. Telogen Effluvium
5. Anagen Effluvium
6. Breakage of hair shaft

2.7 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.[9]

2.8 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.

2.9 Ideal Characteristics of Hair Oil

-Nourishing and moisturizing to the hair and crown

-Promotes Hair Growth

-Anti-Dandruff and Anti-Itch

-Lightweight

-Natural and Gentle

-Pleasant Aroma

3. MATERIAL AND METHOD

3.1 Shikakai

Table 1: Taxonomy of Shikakai.

Botanical Name	Acacia Concinna
Kingdom	Plantea
Division	Magnoliophytas 3
Class	magnoliospida
Order	Fabales
Family	Fabaceae
Genus	Senegalia
species	s.rugata
Part used	fruit

Plant description Habit: A big climbing shrub with a rachis of leaves and branches dotted with many hooked prickles. Bark: Pale brown, polished.

Leaves: Bipinnate, spiky on the rachis but not on the stipules, with 12-25 pairs of leaflets and a big gland located between the uppermost or two uppermost pairs of pinnae and in the center of the petiole beneath the pinnae.

Inflorescence: It is a cluster of two or three spherical, stalked flower heads that appear paniculate, or to form panicles, in the axils of the top reduced leaves. The velvety stalk, or peduncles, that holds the cluster is 12.5 cm long. Mature flower heads have a diameter of approximately 1 cm.

Flowers: Complete, activity morphic, hermaphrodite, white or yellowish Fruits: Thick, meaty pods that are 7–12 cm long and 1.8-2.8 cm wide. The pods are slightly constricted between the seeds and wrinkle when they get dry Six to ten seeds**.**

Flowering and Fruiting Time: August-October-November.

Fig. No. 4: shikakai.

3.2 Amla

Table 2: Taxonomy of Amla.

Botanical Name	Phyllanthus Emblica
kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopsida
Order	Euphorbiales
Family	Euphorbiaceae
Genus	Phyllanthus L
Species	Phyllanthus E L
Part Used	Fruit

- **Plant Description**;-The tree is bitsy to medium in size, growing to a height of 1 to 8 measures (3 bases 3 elevation to 26 bases 3 elevation). The branch lets are frequently evanescent, 10- 20 cm (3.9- 7.9 inch) long and neither rough nor finely pubescent. Simple, subsessile, light green leaves that act pinnates are tightly clustered along branch lets. The flowers have an unheroic-green color. The fruit has six perpendicular stripes or furrows and is nearly globular in shape. Its look is rigid and smooth. Its color is pale greenish unheroic.
- **Geographic Source: -** Amla is native to the tropical South Asian countries of India, Pakistan and Bangladesh. It's deified by the Hindu and its use has been woven into religious solemnities and observances.
- **Chemical constituents:** Vitamin C, pectin, phenolic compounds, gallic acid, ellagic acid, corilagin, phyllantidine and phyllantine (both alkaloids) are all highly concentrated in amla. It contains 1000 Botanical Name Phyllanthus Emblica Kingdom Plantae Division Magnoliophyta Class Magnoliopsida Order Euphorbiales Family Euphorbiaceae Genus Phyllanthus L Species Phyllanthus E L Part Used Fruit 1700 mg of ascorbic acid per 100 grams. The hydrolyzable tannins pedunculagin, punigluconin and emblicanins A and B are also present.

Fig no. 5 Amla.

3.3 Curry Leaves

Table 3: Taxonomy of Curry Leaves.

Botanical Name	Murraya Koenigii
Kingdom	Plantae
Division	Magnoliophyte
Class	Magnoliopside
Order	Sapindales
Family	Rutaceae
Genus	Murraya
Species	Koenigii
Part Used	Leaf

- **Plant Description**: Curry leaves average 2-4 centimeters in length and 1-2 cm in width. They are modest in size, long, slender and oval in shape, narrowing to a point. Each branch of the glossy, dark green leaves, which grow pinnately along a stem, can support up to twenty closely grouped leaves. Curry leaves have been likened to citrus, asafoetida, anise and lemongrass due to their powerful flavor and intense scent. Curry leaves have a nutty scent and a mild, somewhat aromatic bite when cooked.

- **Geographic Source:** Murraya Koenigii is native to China and Hainan, stretching eastward from Pakistan, Sri Lanka and India. In South-East Asia, certain regions of the United States and Australia, it has been widely farmed. It is grown in several tropical African nations, such as Nigeria, Kenya, Tanzania and the majority of the Indian Ocean Islands, where Indian immigrants have made their home.

- **Powder Characteristic:** The key distinguishing features include its green hue, lack of order or flavour, unicellular, bent or curved trichomes, two-layered palisade, part of its secretory canals, well-developed pericyclic fibers and a few prismatic calcium oxalate crystals. Green, pinnate leaves are produced. The leaves have a fragrant and harsh taste.

Fig. No. 6: Curry Leaves.

3.4 Fenugreek Seeds

Table 4: Taxonomy of Fenugreek Seeds.

Botanical Name	**Triglmellafoenum-graecum**
Kingdom	Plantae
Division	Magnoliophyta
Class	Mangnoliopsida
Order	Fabales
Family	Fabaceae
Genus	Trigonella
Species	Foenum-gracecum Linn
Part Used	Seeds

- **Fenugreek seeds Description:-**Trigonella foenumgraecum, is a periodic herbaceous factory in the Fabaceae family that's tended for its leaves and seeds, which are used as a spice and condiment. The factory can have one stem or branches at the base of the stem. The factory has small, trifoliate leaves with round circulars that range in tinge from green to purple.

- **Seeds:-**The seeds are straight- surfaced, 3- 5 cm long, mm thick and unheroic in color. They've a rhomboidal, pebblelike shape. There's no taste or flavour to the nutritive fiber and protein that make up the maturity of fenugreek seeds. It has been discovered that factory towel societies from seeds cultivated in ideal conditions can yield up to 2 diosgenin and lower quantities of gitogenin and trigogenin. High attention of proteins, carbohydrates, flavonoids, alkaloids, saponin, free amino acids, glycosides, gum, minerals and much further are the main constituents of fenugreek seeds. fresh exploration has demonstrated its efficacity in treating gastrointestinal irregularities, dwindling cholesterol and lowering blood glucose situations.[12]

Fig no.7: Fenugreek Seeds.

3.5 Hibiscus

Table 5: Taxonomy of Hibiscus.

Botanical Name	**Triglmellafoenum-graecum**
Kingdom	Plantae
Division	Magnoliophyta
Class	Mangnoliopsida
Order	Fabales
Family	Fabaceae
Genus	Trigonella
Species	Foenum-gracecum Linn
Part Used	Seeds

- **Plant description:-**The Hibiscus rosa- sinensis is a bitsy tree or shrub with lustrous leaves that grows to a height of 2.5 – 5 m(8 – 16 ft) and a range of 1.5 – 3 m(5 – 10 ft). It blooms brilliant red in summer and afterlife in solitary flowers. The fivepetaled flowers have a periphery of 10 cm(4 in) and stand out due to their scarlet anthers with orange tips**.**

- **Chemical ingredients:-** β- sitosterol, stigmasterol, taraxeryl acetate, three cyclopropane chemicals and their derivations are set up in the leaves and stems. Flowers are rich in flavonoids, vitamins, niacin, thiamine, riboflavin and cyanidin diglucoside. Deep unheroic flowers have been set up to contain quercetin-3-diglucoside, 3,7- diglucoside, cyanidin -3,5-diglucoside and cyanidin-3-sophoroside glucoside; ivory white flowers have been set up to contain all of the forenamed composites as well as kaempferol- 3xylosylglucoside**.**

Uses:-The flowers of Hibiscus Rosa- sinensis are comestible and are used in salads in the Pacific islets. The flower is also used in hair care as a medication. It's also used to corridor of India. It can also be used as a pH index .shine shoes in certain.

Fig. No. 8: Hibiscus.

3.6 Almond Oil

Table 6: Taxonomy of Almond oil.

Botanical Name	***Prunus Dulciss***
Kingdom	Plantae
Division	Magmoliophyta
Class	Magnoliopsida
Order	Rosales
Family	Rosacea
Genus	Purnus
Species	P. amygdalus
Part Used	Seeds

- **Plant Description:-**Almond trees have a hardy dormant season and are deciduous. The trees, which typically reach heights of 3 to 4.5 meters (10 to 15 feet), are incredibly stunning when they bloom. North of the equator, they bear fragrant, five-petaled, pink to white blooms from late January to early April.
- **Chemical Constituents:-** About 68% of the oil was discovered to be oleic acid (C18:1), 25% to be linoleic acid (C18:2), 4.6% to 4.8% to be palmitic acid (C16: 0) and a little amount of palmitoleic acid (C16:1) and stearic acid (C18: 0). Arachidic acid (C20: 0) was also detected in trace amounts.

Fig. No. 9 Almond Oil.

Uses

1. Almond oil is used as a scalp treatment.
2. Its fungicidal and antibacterial qualities enable it to effectively balance the yeast responsible for dandruff. Almond oil works effectively to moisturize the scalp, clean the hair follicle, reduce frizz and repair damaged hair since it absorbs well into the epidermis.

3. Apply a dime-sized amount or less to the end of hair before drying to hydrate and decrease frizz. Almond oil rich in vitamin E is used in the treatment of hair loss and strengthens the hair.

3.7 Coconut Oil

Table 7: Taxonomy of Coconut Oil.

Botanical Name	Cocos Nucifera (L)
Kingdom	Plante
Division	Tracheophyta
Class	Magnoliopsida
Order	Arecales
Family	Arecaceae
Genus	Cocos L
Species	Cocos Nuciferaan L
Part Used	Fruit

- **Plant Description**:-The smooth, columnar, light grey-brown trunk of a cocos nucifera tree measures 30 to 40 cm in diameter at breast height and it is crowned by a terminal crown of leaves. Dwarf alternatives also exist; tall alternatives can reach a height of 24–30 m. The trunk is normally erect but may be bent or bending. It is slender and just slightly enlarged at the base. On the broadest section, the leaves are pinnate, feathershaped and 4–7 m long by 1-1.5 m wide. The leaf stalks are thornless and range in length from 1-2 cm. Tiny, pale yellow flowers appear in groups from canoe-shaped sheaths encasing portions of the leaves. The hollow inside of the nut is partially filled with a liquid that is called “coconut milk.” In unripe fruit, coconut milk is significant, but it is gradually absorbed.[1,5]
- **Chemical Constituents**:-Cocos nucifera’s chemical components have a variety of biological effects, including anticancer, antihelmintic, anti-inflammatory, antinociceptive, antioxidant and antifungal properties.

Fig. No. 10: coconut Oil.

3.8 Neem oil

Table 8: Taxonomy of Neem Oil.

Botanical Name	Azadirachta lndica
Kingdom	Plantae
Division	Magnoliophyta
Class	Magnoliopside
Order	Sapindalaes
Family	Meliaceae
Genus	Azadirachta Juss
Species	Azadirachta indica
Part Used	Leaf

Plant description:- Height 15-20 m (about 50-65 feet) flowers extremely fragrant and sweet-smelling, especially at night; blooms from March to May; white and fragrant; auxiliary; typically arranged in somewhat drooping panicles up to 25 cm (10 in.) long; inflorescences branch up to the third degree, bearing 150–250 flowers; blooms are 5–6 mm long and 8–11 mm wide; protandrous, bisexual and male flowers exist on the same individual. Fruit Ripes in July and August; evergreen; branches widely spaced; old foliage remaining long after new leaves have sprouted. Leaves: The terminal leaflet is frequently absent and the petioles are short. The opposite, pinnate leaves measure 20–40 cm (8–16 in.) in length, with 20–31 medium–to–dark green leaflets measuring 3–8 cm (1–3 in.) in length.[16]

- **Chemical constituent**:- main chemical component are nimbin, nimbinenem, azadirachitn, azadirachmol, desacetynimbinene, nimbandiol, nimbolide, queretin, beta-sitosterol, n-hexacosanol, nimbiol and nimocin.

Fig. No. 11: Neem Oil.

4. RAW MATERIAL

Fig no. 12: Raw Material.

4.1 Formula

API

Table 9: Ingredients and Quantities of Herbs.

Sr.No	Ingredients	Quantity (ml per 100 ml)
1	Fenugreek seeds	2
2	Curry leaves	4
3	Hibiscus	2

Exipient

Table 10: Excipients with their Quantity.

Sr.No	Ingredients	Quantity (ml per 100 ml)
1	Amla	10
2	Shikakhai	5
3	Amla	25
4	Neem	2
5	Coconut	Q.S

5. METHOD OF PREPARATION

- Plant material and extraction procedure

Different plants were collected from the nature and they were authenticated in department of botany, pharmacopoeia laboratory of Indian medicine. Herbal Hair Oil formulation is the composition of Fenugreek seeds, curry leaves and hibiscus.[17]

5.1 Extraction Procedure Of Fenugreek Seeds

- **Material Required**

1. Fenugreek seeds material (dried or fresh)
2. Solvent(e.g., ethanol, methanol, or water)
3. Magnetic stirrer
4. Round-bottom flask(100-500Ml)
5. Filter paper or cheesecloth

- **Extraction Procedure**

Step 1: Preparation of Fenugreek seeds

1. Dry the Fenugreek seeds material completely to remove any moisture.
2. Grind the dried plant material into a fine powder using a grinder or mortar and pestle.

Step 2: Extraction.

1. Weigh the powdered plant material (e.g., 3-4 g).
2. Add the solvent (e.g., ethanol) to the round-bottom flask, ensuring the powdered material is completely covered.
3. Place the stirring bar in the flask and position the magnetic stirrer underneath.
4. Set the stirrer to a moderate speed (e.g., 400-600 rpm).
5. Allow the mixture to stir for 25-30 min, depending on the desired extraction efficiency.

Step 3: Filtration

1. Stop the stirrer and filter the mixture using filter paper or cheesecloth to separate the solids from the liquid extract.
2. Discard the solids and collect the liquid extract.

5.2 Extraction Procedure Of Curry Leaves

- **Materials Needed**

1. Curry leaves (dried or fresh)

2. Solvent (e.g., ethanol, methanol, water or hexane)
3. Magnetic stirrer
4. Stirring bar (magnetic)
5. Round-bottom flask (100-500 mL)
6. Filter paper or cheesecloth

- **Extraction Procedure**

1. Thoroughly dry the curry leaves to eliminate excess moisture.
2. Use a grinder or mortar and pestle to pulverize the dried curry leaves into a fine, uniform powder.
3. Weigh the powder: Weigh the powdered curry leaves (e.g., 2-4 g).
4. Add solvent: Add the solvent (e.g., ethanol) to the round-bottom flask, ensuring the powdered curry leaves are completely covered.
5. Magnetic stirring: Place the stirring bar in the flask and position the magnetic stirrer underneath. Set the stirrer to a moderate speed (e.g., 200-400 rpm).
6. Extraction: Allow the mixture to stir for 25-30 min, depending on the desired extraction efficiency. The solvent will extract the bioactive compounds from the curry leaves.
7. Filteration: Stop the stirrer and filter the mixture using filter paper or cheesecloth to separate the solids from the liquid extract.
8. Storage: Transfer the extracted neem leaf oil or extract to a clean, dry glass container. Store it in a cool, dark place.

5.3 Extraction Procedure OF Hibiscus Leaves

- **Materials Required**

1. Hibiscus Leaves: Dried or fresh leaves of the Hibiscus plant.
2. Solvent: A suitable solvent such as ethanol, methanol, or water
3. Magnetic Mixer: A laboratory-grade magnetic mixer or stirrer.
4. Magnetic Stir Bar: A magnetic stirring bar or rod.
5. Round-Bottom Flask: A 100-500 mL round-bottom flask.
6. Filter Paper or Cheesecloth: A suitable filtration medium.

- **Extraction Protocol**

1. Dehydration of Hibiscus Leaves: Completely desiccate the Hibiscus leaves to remove any residual moisture.

2. Pulverization of Leaves: Grind the dried Hibiscus leaves into a fine, uniform powder using a grinder or mortar and pestle.
3. Gravimetric Analysis: Accurately weigh the powdered Hibiscus leaves (e.g., 1-2 g).
4. Solvent Addition: Add the solvent (e.g., ethanol) to the round-bottom flask, ensuring the powdered Hibiscus leaves are completely submerged.
5. Magnetic Mixing: Position the magnetic stirrer underneath the flask and set the stirrer to a moderate speed (e.g., 500-700 rpm).
6. Extraction Process: Allow the mixture to stir for 2-4 hours, depending on the desired extraction efficiency, to facilitate the transfer of bioactive compounds from the Hibiscus leaves to the solvent. 7. Filtration: Terminate the stirring process and filter the mixture using filter paper or cheesecloth to separate the solids from the liquid extract.
7. Storage: Transfer the extracted Hibiscus leaf oil or extract to a clean, dry glass container and store it in a cool, dark place to preserve its potency and stability

6. METHOD OF FORMULATION

Step 1: Accurately measure all the extract of all API such as Fenugreek Seeds, Curry Leaves, Hibiscus flower and transfer into the heat resistance glass wear.

Step 2: Measure and add remaining excipient such as Amla powder, Shikakhai powder, Almond oil and Neem oil into the heat resistance glass wear in which all APIs extract present

Step 3: Stir vigoursly to form miscible phase of the all extract and excipients.

Step 4: Boil the miscible solution using the water bath for 5-6 minutes with continuous stirring until the completely monophasic solution form and filter using the muslin clothe.

Step 5: Cool the solution and adjust the final volume using coconut oil and add jasmine as flavouring agent/ fragrant.

Step 6: Transfer the formulation into a well closure bottle and store at room temperature.

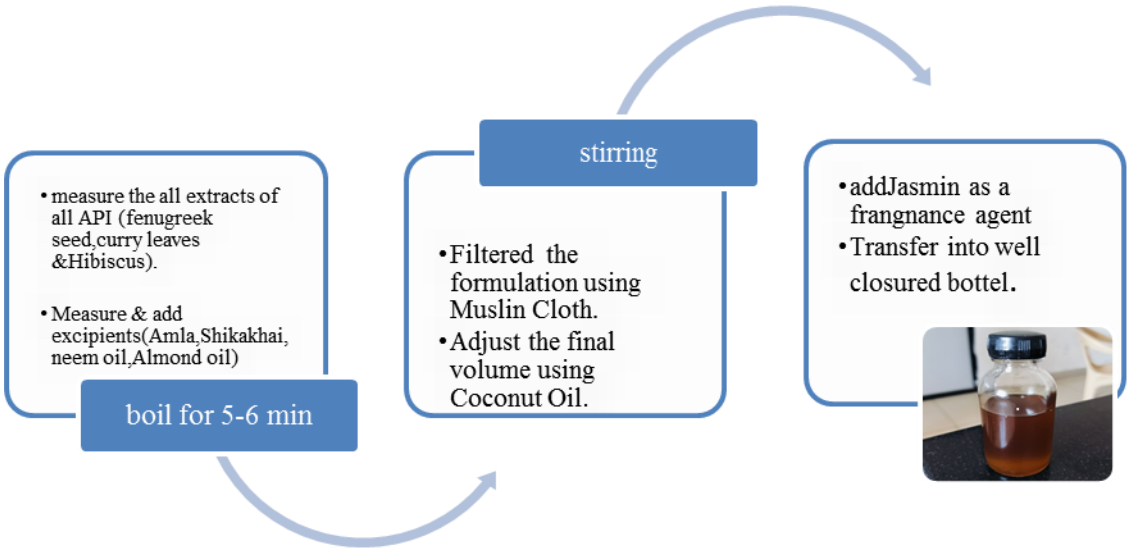

Fig no. 13: Method of formulation.

7. EVALUATION PARAMETERS: EVALUATION TEST FOR HAIR OILS

7.1 Physical Appearance

Table 11: Physical Appearance.

Sr. No	Parameters	Result
1	State Liquid	Liquid
2	Colour	Caramel Brown
3	Order	Aromatic

7.2 pH Determination:-The pH of the hair oil was ascertained utilizing a digital pH meter, ensuring accurate and precise **measurements.**

7.3 Acid Value.

Preparation of 0.1 Molar Potassium Hydroxide (KOH) Solutions.

1. Accurate Weighing: Weigh 0.56 g of potassium hydroxide (KOH) pellets using an analytical balance. 2. Dissolution: Dissolve the KOH pellets in 100 mL of distilled water in a volumetric flask. 3. Stirring: Stir the solution continuously to ensure complete dissolution of the KOH pellets. 4. Filling the Burette: Fill a burette with the prepared 0.1 molar KOH solution. Measure 10 mL of hair oil using a pipette. Dissolve the hair oil in 50 mL of a 1:1 ethanol-ether mixture in a conical flask. Shake the mixture vigorously to ensure complete dissolution of the hair oil. Add 1 mL of phenolphthalein solution (1% w/v) as an indicator to the hair oil mixture. Titrate the hair oil mixture with the 0.1 molar KOH solutions from the

burette. Record the volume of KOH solution required to reach the endpoint, indicated by a colour change from colourless to pink.

7.4 Saponification Value: Accurately weigh 1 ml of oil into a 250 ml of conical flask and 10 ml of ethanol: ether mixture (2:1) was added. To this flask, 25 ml of 0.5 N alcoholic KOH was added. Keep the flask for 30 min and the flask was cooled. The cooled solution was titrated against 0.5 N HCl using phenolphthalein as indicator. Similarly, the blank titration was performed without taking oil (sample). The amount of KOH in mg used was calculated. Saponification value = B-S) N/W Were, S = ml of KOH required to neutralize the substance B = ml of KOH required for blank N= Normality of standard Hydrochloric acid. W = Weight of the sample taken for the test (g).

7.5. Viscosity Test

Step 1: Preparation of Specific Gravity Bottle

Rinse a clean, dry specific gravity bottle with distilled water to remove any contaminants. Dry the bottle in an oven at a controlled temperature for 15 minutes to remove any residual moisture Let the bottle cool to room temperature. Close the bottle with its cap and record its weight (Weight 'a') using an analytical balance.

Step 2: Sample Preparation

Carefully fill the specific gravity bottle with the herbal oil sample, ensuring complete filling and minimizing air entrapment. Close the bottle with its cap and record its weight (Weight 'b') using an analytical balance. Rewrite these sentences in professional words). Viscosity Measurement Using Ostwald's Viscometer The viscosity of the herbal oil is determined using Ostwald's viscometer, which measures the time it takes for a fixed volume of the oil to flow through a narrow capillary tube. The viscosity is then calculated based on the measured time and the density of the oil, which is determined from the weight of the sample per millilitre.

7.6 Sedimentation Test

Allow the prepared herbal oil sample to stand undisturbed for a period of 12-24 hours. Observe and record any signs of sedimentation or phase separation that may occur during this time period.

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

Table 12: Ingredient with their importance.

Sr.no	Ingredients	Importance
1	Shikakai	Anti-dandruff
2	Amla	Stimulate Hair Growth
3	Curry	Treat Damaged hair
4	Fenugreek seeds	Hair Growth
5	Hibiscus	Stop Hair Loss
6	Almond oil	Treat hair loss and strengthens the hairs
7	Coconut oil	Moisturizes dry hair
8.	Neem Oil	Reduce Dandruff

8. RESULT AND DISCUSSION

Table 13: Evaluation Parameter with their Inference.

Sr. No	Evaluation Parameter	Inference
1	Physical Appearance	No Changes
2	State	Liquid
3	Colour	Caramel Brown
4	Order	Aromatic
5	Determination of pH	5.4
6	Acid Value	2.24
7	Saponification Value	194.2
8	Viscosity	0.948
9	Sedimentation	No
10	Skin Irritation	No skin irritation

The formulation and evaluation of the herbal hair oil resulted in a product with promising characteristics and potential benefits for hair health. Let's delve into the findings and their implications.

8.1 Physical Appearance and Characteristics: The herbal hair oil appeared as a Caramel brown liquid with an aromatic odour. This physical appearance aligns with typical herbal hair oils, indicating a successful formulation process oils, indicating a successful formulation process.

Fig no. 14: Physical Appearance.

8.2 Determination of ph.:-The pH value of the herbal hair oil was measured at 5.4, aligning with the scalp's natural pH range of 4.5 to 5.5. This congruence supports the maintenance of the scalp's natural balance and health.

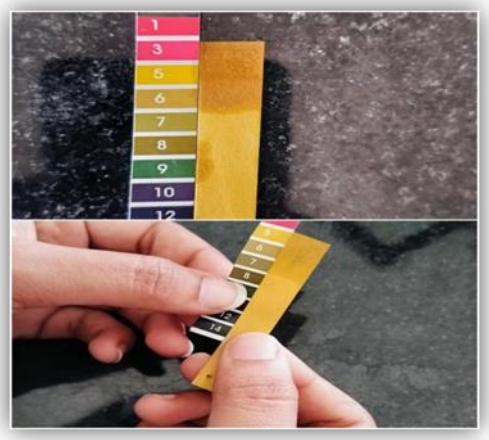

Fig no. 15: determination of Ph.

8.3 Acid Value The acid value of the herbal hair oil painting was determined to be 2.24. A low acid value indicates a lower content of free adipose acids, which is desirable for quality canvases. The acid value is essential in assessing the quality and stability of herbal hair canvases. High acid values can indicate1. Rancidity Oxidation of the oil painting, leading to out- flavours and off- odors.2. Declination Breakdown of the oil painting's triglycerides, affecting its texture and performance. And the End point will be Colourless to pink.

Fig no. 16: determination of Acid Value.

8.4 Saponification Value: The Saponification value of the herbal hair oil was determined to be 194.2. The saponification value reflects the average molecular weight of the fatty acids present, which can influence the oil's cleansing efficacy. The saponification value is essential in evaluating the quality and characteristics of herbal hair oils. It can impact:1. Foaming and cleansing properties: The ability of the oil to create a rich lather.2. Moisturizing and nourishing properties: The ability of the oil to hydrate and nourish the hair. And the End point will be pink to colourless.

Pink to colourless (Blank solution).

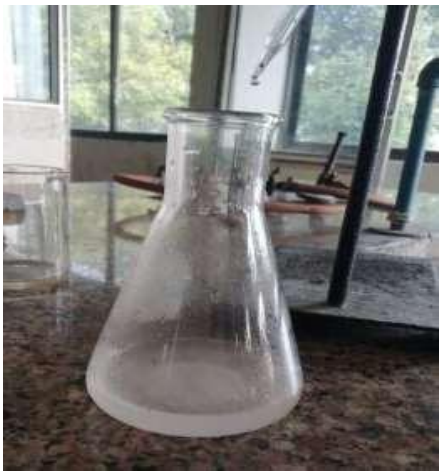

Fig no. 17: determination of Saponification Value

8.5 Test for Viscosity:- : The viscosity measure by the Ostwald viscometer of the herbal hair oil was determined to be 0.948.

Fig no. 18: Determination of Viscocity.

8.6 Sedimentation Test: The herbal hair oil shows no signs of sedimentation or separation.

Fig no. 19: Sedimentation Test.

8.7 Skin Irritation Test: The skin shows no signs of irritation or allergic reactions.

Fig no. 20: Skin Irritation Test.

9. CONCLUSION

In this study, we successfully formulated and evaluated herbal hair oil enriched with a blend of natural extracts and oils known for their beneficial effects on hair health. The herbal hair oil exhibited desirable physical characteristics, including a Caramel -brown colour and a

pleasant aromatic odour. Importantly, its pH value fell within the range conducive to scalp health, indicating compatibility with the scalp's natural environment. Our research indicates that the herbal hair oil formulation, composed of ingredients like Shikakai, amla, curry leaves, fenugreek seeds, hibiscus, almond oil, coconut oil, and neem oil, exhibits favourable chemical properties and demonstrates stability and safety for topical use. These components collectively enhance hair health by offering benefits such as anti-dandruff properties and promoting hair growth. This study confirms the effectiveness of herbal hair oils as natural alternatives to synthetic products, informing future research on formulation optimization and exploration of additional botanical ingredients.

REFERENCES

1. Pavan S, Pratibha C, Kavitha P, Saraswathi C (2021) Formulation and Evaluation of Herbal Hair Oil. International Journal of Pharmaceutical Research and Applications, 6(5): 1285-1299.
2. Yamini N, Sudha, Jyotsana, Pratyusha K, Pratyusha J, et al. (2018) Formulation and Evaluation of Polyherbal Hair oil. Journal of Pharmacognosy and Phytochemistry, 7(3): 3254-3256.
3. Suman K, Kumar B, Mukopadayay S (2022) Herbal hair oil: A review. International Journal of Health Sciences, 6(2): 13449-13465.
4. Gaurav T, Ruchi T (2021) Research Article on Assessment of Nutraceutical Potential of Herbs for Promoting Hair Growth: Formulation Considerations of Herbal Hair Oil. The Open Dermatology Journal, 15: 78-83.
5. Shamali S, Karishma A, Anuja S, Mahesh S, Pratiksha O (2022) Research Article On Evaluating Hair Growth Activity of Herbal Hair Oil. World Journal of Pharmaceutical and Life Sciences, 8(11): 88-95.
6. Swetha D, Krishna M (2014) Review Article on Current Trends in the Research of Emblica officinalis (Amla) A Pharmacological Perspective. Int J Pharm Sci Rev Res, 24(2): 150-159.
7. Pawar S, Bharati R, Sathe G, Dawane K, Umalkar D (2021) A phrmlogical review on amla (emblica) international journal of creative research thoughts. International Journal of Creative Research Thoughts, 9(2): 3482-3488.
8. Divya B (2022) A review on Hair Conditioner Containing Curry Leaves, Amla, Aloe vera, Neem & Flaxsee. International Journal of Creative Research Thoughts, 10(1): 635-652.

9. Sinha P, Akhtar J, Batra N, Jain H, Bhardwaj A (2012) Review on Curry Leaves – A Medicinal Herb. Asian Journal of Pharmaceutical Research, 2(2): 51-53.
10. Sajad Ahmad Wani, Pradyuman Kumar (2016) Fenugreek: A Review on Its Nutraceutical Properties and Utilization in Various Food Products. Journal of the Saudi Society of Agricultural Sciences, 17(2): 97-106.
11. Usha K, Rajesh, Sindhu A (2017) Herbs Used in Formulating Poly Herbal Hair Oil – A Review. Indo American Journal of Pharmaceutical Sciences, 4(6): 1527-1539.
12. Chinju M, Feka S (2021) A Review: Medicinal Value of Hibiscus Rosa Sinensis. International Journal of Pharmacognosy and Chemistry, 2(1): 1-11.
13. Nemane S, Dharmaraj S (2022) Review on: Comparative Study Of Different Constituents Of Enerally Used Polyherbal Oil. International Journal of Creative Research Thoughts, 10(1): 654-672.
14. Sakshi V. Kakade, Kalyanee V. Gavande, Dr. Amol N. Khedkar, Sakshi S. Kakade Formulation and Evaluation of Herbal Hair Oil, 2023; 1-6.
15. Gautam S. Fomulation and evaluation of herbal hair oil. Int J Chem Sci, 2012; 10: 349- 53.
16. Ansari S.H. and Ali M. Hair care and herbal drug. Indian J Nat Prod, 1997; 13(1): 3-5.
17. Purwal, L., Gupta, S. B. N. and Pande, M.S. Development and Evaluation of Herbal Formulations for hair growth, E- Journal of Chemisrty, Jan 2008; 5(1): 34-38.
18. Adhirajan, N., Dixit, V. K., Chandrakasan, G., Development and Evaluation of Herbal Formulations for Hair growth, Indian Drugs, Nov-2001; 38(11): 559-563. 5. Roy, R. K., Thakur, M., Dixit, V. K., Development and Evaluation of polyherbal formulation for hair growth- promoting activity, Journal of Cosmetic Dermatology, Nov- 2006; 6: 108-112.