

## Research Paper

### Formulation and Evaluation of Herbal-Medicated Hair Oil for the Treatment of Scalp Disorders and Promotion of Hair Growth.

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#### Abstract:

A rising need for natural and safe personal care alternatives has encouraged the development of herbal formulations with pharmacological advantages. The research being conducted emphasises on the development and testing of a herbal-medicated hair oil made from historically used medicinal herbs renowned for their beneficial effects on hair health. *Embolica officinalis* (Amla), *Eclipta alba* (Bhringraj), *Hibiscus rosa-sinensis*, *Azadirachta indica* (Neem), and *Cocos nucifera* (Coconut oil) were meticulously prepared to be incorporated into a stable oil composition. In vitro and in vivo models were used to determine the physicochemical properties (such as viscosity, pH, and stability) as well as the pharmacological activities of the produced herbal oil, which included antifungal, antibacterial, anti-dandruff, and hair growth-promoting actions. The results showed a considerable increase in scalp health, a reduction in hair loss, and promotion of hair regeneration, indicating the formulation's efficacy. The results suggest the use of herbal-medicated hair oils as a viable alternative to synthetic therapies, as they provide effectiveness with little adverse effects.

Keywords: Oleander, herbal cosmetics, dandruff, and herbal hair oil, synthetic therapies.

## Introduction:

Hair is one of the characteristics of mammals and performs various functions such as protection against external factors such as heat, cold, etc. Hair is an important part of the body and serves as a protective attachment to the body as well as a supporting structure for integration. sebaceous and sweat glands. The main parts of the hair are the bulb, the root and the shaft<sup>1</sup>. Hair loss, dandruff, lice, split ends and gray hair are some of the common hair problems<sup>2</sup>. Hair may look simply, but it is one of the most complex structures in the body. Hair contains two structures<sup>3</sup>.

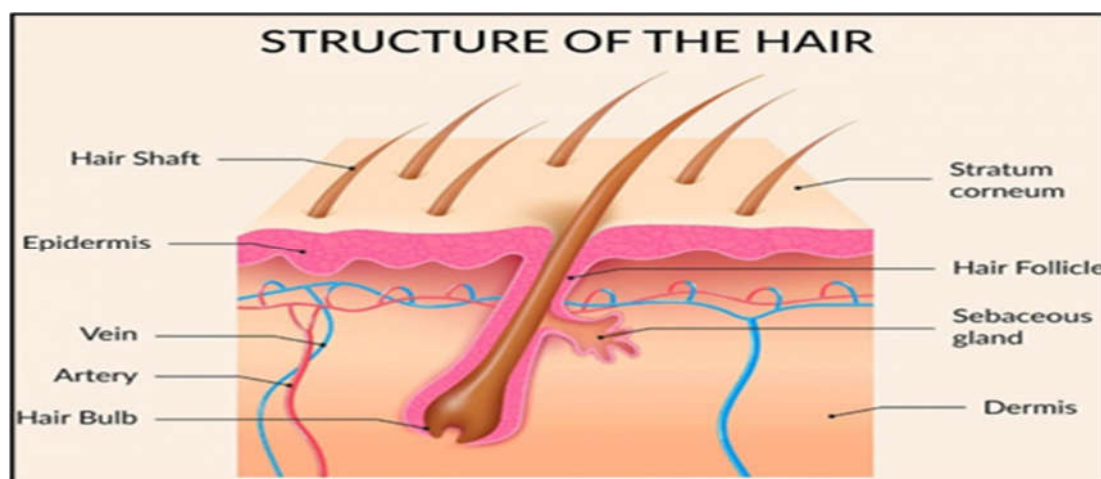
## Hair Follicle:

The hair follicles are the starting point of hair growth and the places where hair is shed. This causes the production of moisture that begins in the pores. It is believed in dehydration. The fold is surrounded by an outer inner layer that covers and protects the expanding skin, which is finished before the fat cells are created.

## Hair shaft

The hair shaft is the part of the hair that contain of three layers of keratin.

- **Inner layer:** This is called medulla. Depending on the type of hair, the original is not always available.
- **Middle layer:** This layer that covers most of the hair shaft is called the cortex.
- **Outer layer:** Also called cuticle which consists of tightly packed scales in a layered roof like structure.



**Fig. 1:** Structure of the hair

Hair type mainly depends on the curls. The number of hair follicles contributes to the hair follicle count. Genetics plays a role in determining hair type and is acknowledged for establishing a classification system that categorizes hair into four types based on its curling patterns such as Straight category, Wavy category, Curly category, Coily category.

The growth process is divided into three phases:

- a) The Anagen phase:** This phase extends over a period of two to six years. The hair pushes the new hair that has fallen out to prevent it from coming out of the braid line.
- b) Catagen Phase:** Catagen Phase is a headache and is always in this phase. This time duration two to three days.
- c) Telogen phase:** The telogen phase lasts for two to three months, in the telogen phase the hair is supported and the albatross is fully formed<sup>4</sup>.

## HAIR OIL

Hair oil is a product used for hair care. Hair care products are defined as formulas used to clean the hair, improve the appearance of the hair, nourish the hair and maintain the healthy appearance of the hair<sup>5</sup>. Hair oil applied to the hair helps in managing baldness, gray hair, hair fall, dry hair and at the same time nourishes the hair<sup>6</sup>. Herbal cosmetics are in high demand due to the growing interest of people in them, herbal cosmetics are more effective with less side effects and the ingredients are easily available<sup>7</sup>. Herbal hair oil plays a crucial role as an ingredient in herbal cosmetics. Vegetable oils are preferred and used in many hair products<sup>8</sup>.

They not only stimulate hair growth but also supply the scalp with the necessary moisture to enhance the beauty of hair. Herbal oils containing herbal medicines are known as hair tonics<sup>9</sup>. Herbal hair oil delivers a range of beneficial nutrients that support the normal functioning of sebaceous glands and foster natural hair growth.<sup>10</sup> One of the most popular hair care products<sup>11</sup>.

As people's living standards improve, the use of hair oil increases every day. Spices and herbal flavors are added to the hair oil to give it a natural flavor and colour. We live in a dirty world that is not fit for hair. This is where the usefulness of herbal hair oils becomes apparent.

This herbal oil is a blend of Amla, Nirgundi, Bhringraj, Jatamansi, Gammbhari, Shankpushpui, Shikakai, Brahmi, Kapur, Pudina, Satavari, Til Oil and Coconut oil.

**Its advantages include:**

- ❖ Provides natural benefits. Herbal oils contain vitamins and trace elements that act as food for the hair.
- ❖ Hair oil helps prevent hair loss and added shine to curly hair. The tips of the hairs need special care and the leaves move and feed. Regular use of hair oil with hair oil solves the problem of gray hair.
- ❖ Maintains hair moisture and stimulates hair growth.
- ❖ Prevents dandruff and relief from stress.
- ❖ A dazzling glow emanated from it.

**MATERIALS AND METHODS**

The procedure employed in the preparation of herbal hair tonic. If coconut oil is mixed with many chemicals that contain medicinal properties, it is called a hair tonic. It is prepared by the following process.

- ❖ Textile Method
- ❖ Paste Method
- ❖ Direct Boiling Method

**❖ Textile Method**

The dried substance was weighed and tied in a muslin cloth. Then the cloth in the coconut oil base is removed by constant boiling and stirring and finally the oil is filtered.

**❖ Paste Method**

The paste method is used when the need for fresh fruit or flowers or plants is turned into a paste with a little water and kept overnight. The oil stops whipping and the solution is completely released into the oil. The oil is subsequently strained using a muslin cloth.

**❖ Direct Boiling Method**

The crude drug is powdered, weighed and cooked directly in coconut oil until the drug is completely released into the oil base. The process of preparing Medicated Herbal Hair tonic. Here are the steps for formulating Medicated Herbal Hair Oil.

**❖ Collection of Plants Materials**

The formulation of the medicated herbal hair oil involved gathering diverse plant materials such as Amla, Nirgundi, Bhringraj, Jatamansi, Gambhari, Shankpushui, Shikakai, Brahmi, Kapur, Satavari, Til Oil and Coconut oil. Were purchased from local market of Moradabad and Pudina leaves, Neem leaves, Oleander leaves are collected from Herbal Garden of Moradabad Educational

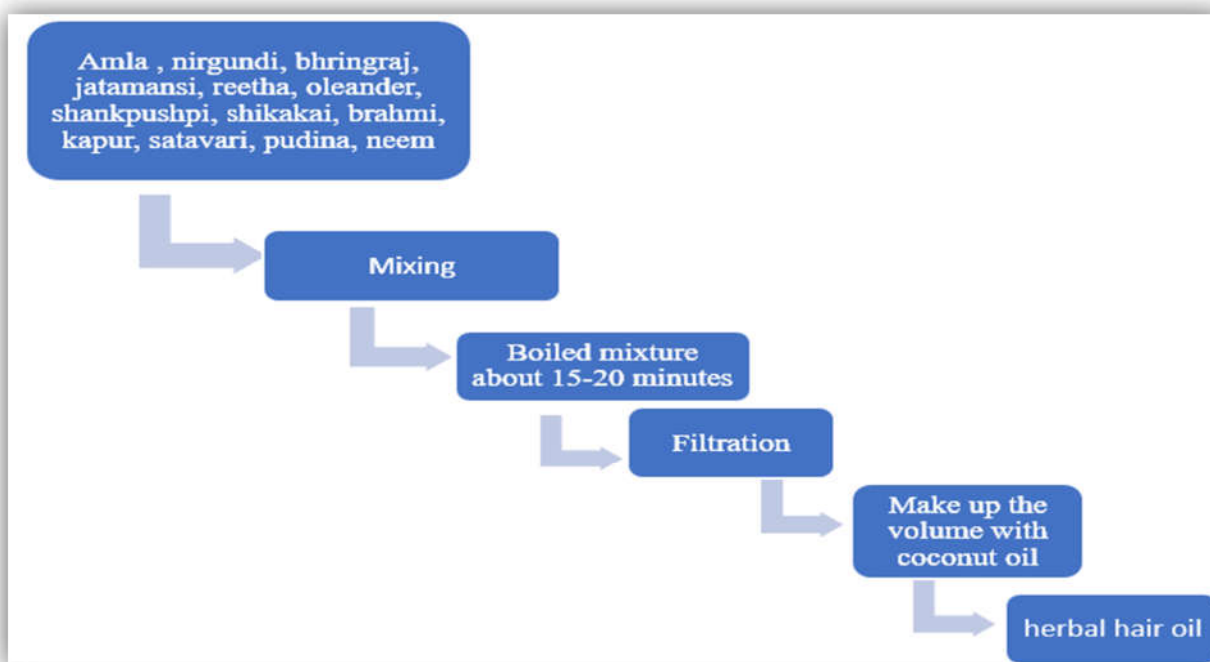
Trust Group of Institution Faculty of Pharmacy Moradabad. Profile of certain herbal ingredients utilized in the formulation of Medicated Herbal Hair Oil.

### Preparation of Coconut Oil Base

Boil the raw medicinal in a base of coconut oil to make a rich hair tonic. Coconut oil is extracted from kernel through the dry process and the entire process of extracting coconut oil from the dry kernel is described above. It is used as a source of fuel and storage. The crude drug is as follows.

### Preparation of medicated herbal hair oil:

Table 1 displays the various components employed in the manufacture of medicated herbal oil. Weigh all dry ingredients carefully and Fresh herbs like jatamansi, neem, amla, shankapushpi, brahmi, reetha, nirgundi, bhringraj, camphor and pudina, Oleander and Til Oil are added. The above is prepared for 20 minutes. The boiled mixture was filtered A piece of muslin. Following the filtration process, a quantity of coconut oil was introduced into the filtrate. A flavouring agent is added at the end .The oil is mixed together and stored in an amber bottle. (See Fig. 2)



**Figure 2: Preparation of Medicated Herbal Hair Oil**

**Table 1 a : Components of Medicated Herbal Hair Oil b; Box-behenken design**

S. No.	Common Name	Quantity percentage (%)
1	Amla	85
2	Nirgundi,	2
3	Bhringraj	10
4	Jatamansi	3
5	Reetha	5
6	Oleander	3
7	Shankpushpui	3.5
8	Shikakai	4
9	Brahmi	7
10	Kapur	1
11	Satavari	2.5
12	Til Oil	63
13	Coconut oil	37
14	Pudina	1
15	Neem	2.5
16	Flavouring agent	2

Independent Variables (Factor)	Sod.AL. (X1)	Cp-934(X2)	Stirring Speed (X3)	Sod.AL. (%)	Cp-934(%)	Stirring Speed(Rpm)
F1	-1	-1	0	1	1	2500
F2	1	-1	0	2	1	2500
F3	-1	1	0	1	2	2500
F4	1	1	0	2	2	2500
F5	-1	0	-1	1	1.5	2000
F6	1	0	-1	2	1.5	2000
F7	-1	0	1	1	1.5	3000
F8	1	0	1	2	1.5	3000
F9	0	-1	-1	1.5	1	2000
F10	0	1	-1	1.5	1.5	2000
F11	0	-1	1	1.5	1	3000
F12	0	1	1	1.5	1.5	3000
F13	0	0	0	1.5	1.5	2500

**Table 2: Different Herbs Used Are as Follows Hair Problems**

S. No	Common Name	Biological Source	Uses
1	<b>Amla</b>	It consists of dried and fresh fruits of the plant <i>Emblica officinalis</i> Gaertn. ( <i>Phyllanthus emblica</i> Linn.), which belongs to the Euphorbiaceae family.	Amla is sun-dried using fresh fruits of <i>Emblica officinalis</i> . The oil obtained from amla is rich in essential fatty acids that promote the growth of geysers. Massaging the scalp with amla oil increases blood circulation to the scalp, which leads to hair growth.
2	<b>Nirgundi</b>	Nirgundi is an Ayurvedic medicine made from the dried leaves of <i>Vitex negundo</i> (vervain family), a large aromatic shrub or small tree up to 4.5m tall.	Nirgundi is already used in traditional systems of medicine such as Ayurveda, Unani and Siddha to treat pain, headache, inflammation, arthritis, rheumatism, rheumatism, asthma, fever, cold and cough.
3	<b>Bhringraj</b>	<i>Eclipta prostrata</i> , commonly known as false chamomile, <i>yerba de tago</i> , <i>Guntakalagaraku</i> / <i>Guntagalagaraku</i> , <i>Karisalankani</i> and <i>bringraj</i> , is a genus of plants in the Asteraceae family. It is common in most parts of the world.	Bhringraj oil is an effective remedy against scalp infections and hair loss. It has an effective effect on the hair and not only strengthens the hair root, but also restores the natural color of the hair. It treats scalp acne, premature graying and promotes healthy and strong hair growth.
4	<b>Jatamansi</b>	<i>Nardostachys jatamansi</i> is a flower of the Valerian family that grows in the Himalayas. It is the source of Spikenard, a type of essential oil that is very fragrant. Since ancient times, the oil has been used as a perfume, for traditional medicine and for religious ceremonies.	According to Ayurveda, jatmansi oil applied to the scalp helps to control hair loss and promote hair growth. This is because hair loss results from increased lack of traffic in the body. Jatmansi or silk oil works to remove hair by balancing the tridosha (vata, pitta and kaphadosha).
5	<b>Reetha</b>	Scientifically known as <i>Sapindus mukorossi</i> , <i>Rita</i> is a broad-leaved shrub in the Sapindaceae family. Its name is <i>Kriti</i> , scientifically known as <i>Sapindus mukorosi</i> , a broad-leaved shrub in the Sapindaceae family.	Reetha is widely used in preparations like shampoo. Dry fruit powder is used as a foaming agent in the shampoo. It clears oily skin secretions and creates a natural lather, so it can be used as a cleanser and hair tonic. It is also used to remove lice from hair.

6	<b>Oleander</b>	The botanical name of the oleander is <i>Nerium indicum</i> Linn. Organic sources of oleander include dried leaves and seeds. It belongs to the Apocynaceae family. Also known as the Bay of Roses	Oleander has long been used to treat heart disease, asthma, diabetes mellitus, corns, measles, cancer and epilepsy, as well as antibacterial/antimicrobial properties for wound healing.
7	<b>Shankpushpi</b>	The wind pluricalis, botanically known as the wind pluricalis, is a perennial plant native to India. This herb, known as morning glory, morning glory, or aloe, has characteristic arching leaves and bulbous blue or white flowers.	Shankpushpi prevents premature graying of hair, controls hair fall and promotes hair growth due to its rasayana (rejuvenating) properties.
8	<b>Shikakai</b>	It is made from the fruits of the <i>Acacia concinna</i> plant. (Leguminosae) a medicinal plant that grows in the tropical rainforests of South Asia and is used for washing hair.	It promotes hair growth, controls hair fall, fights dandruff and adds shine and shine to dull hair. Shikakai is used in many shampoos and conditioners because of its rich saponin content. This naturally foaming agent delicately purifies the scalp and establishes a healthy environment for the hair.
9	<b>Brahmi</b>	<i>Brahmi Centella asiatica</i> (L.) (syn. <i>Hydrocotyl asiatica</i> Linn.) is a fresh or dried herb belonging to the Umbellifera family.	Brahmi helps treat temporary baldness by promoting hair growth in areas where hair has thinned or receded. It also helps reduce hair loss by treating dandruff and reduces inflammation. Its regular use provides a soothing and calming experience.
10	<b>Kapur (CAMPHOR)</b>	Found in the leaves of the East Asian camphor tree ( <i>Cinnamomum camphora</i> ); and camphor ( <i>Dryolanopes</i> sp.), a giant tree in Southeast Asia. It is also found in many other plants of the laurel family, especially <i>Ocotea umbarensis</i> .	Camphor helps improve blood circulation. It cools the scalp and when the blood flow to the hair roots, you will see strong healthy hair. It also has anti-inflammatory properties, so it reduces swelling. Soothes scalp irritation and improves hair texture.
11	<b>Satavari</b>	The drug is obtained from the dried tubers of <i>Asparagus racemosus</i> Willd., which belongs to the Liliaceae family. asparagus. The drug is obtained from the dried tubers of <i>Asparagus racemosus</i> Willd., which belongs to the	Prevents skin irritation caused by skin and scalp itching and promotes hair growth. Stress is one of the main causes of hair loss, it is related to physical and emotional stress that causes hair loss. It also



		Liliaceae family.	strengthens hair roots by increasing blood circulation.
12	Coconut oil	Coconut, <i>Cocos nucifera</i> (L.), also known as coconut, coco-da-bahia or peanut-coconut, is an important member of the family Arecaceae (palm family) (1). The plant is native to Southeast Asia (Malaysia, Indonesia and the Philippines) and islands between the Indian and Pacific Oceans.	Coconut oil is not only healthy for your scalp, but it also moisturises your hair. Because it is easily absorbed, it works better than other oils at restoring damaged hair. Remember that while coconut oil may not be effective as a shampoo to cleanse hair, it will condition hair when used as a pre-shampoo therapy.
13	Pudina	Peppermint contains the dried leaves and petals of <i>Mentha spicata</i> Linn, which belongs to the mint family.	Mint leaf extract is a source of carotene and antioxidants that promote hair growth and prevent hair loss. The powerful antibacterial and antifungal properties of mint leaves can treat dandruff, lice, etc.
14	Neem leaves	Neem <i>Azadirachta indica</i> consists of all parts of the plant used medicinally. Also known as margoza, Indian lilac and Indian <i>azadirachta</i> ..	Neem oil is a natural by product of the Neem tree, which grows mainly in India. This oil is produced from the fruits and seeds of plants. This "miracle plant" is widely used in traditional medicine and has been proven to have anti-inflammatory and antibacterial properties.
15	Til Oil	Sesame ( <i>Sesamum indicum</i> L.), belonging to the Tubiflora group in the Pedaliaceae family, is an annual herb cultivated for its edible seeds, oil and flavoring properties. Due to its high antioxidant and anti-sweet properties, it is also known as gingelli, tilam, benna and is referred to as the "queen of oilseeds".	Til oil or sesame oil is a good alternative to expensive hair health treatments that are often associated with harmful side effects. Sesame oil promotes hair growth, eliminates dandruff and helps slow down premature graying of hair. However, be sure to consult a dermatologist before trying new hair treatments.



Figure 3: Various herbs used in hair oil formulation

## Evaluation of Ayurvedic Herbal Oil

The prepared Medicated Herbal Oil underwent both physical and biological assessments

### 1. Chemical Evaluation

#### ❖ Acid value

Prepare 0.1 M: Weigh 0.56 g of KOH globules and dissolve in 100 ml of distilled water and shake. The resistance was prepared with 0.1 mol KOH solution in burettes. Sample preparation: 10 ml of oil and Dissolve 25 mL of ethanol and 25 mL of ether in the mixture and stir. 1 ml of phenolphthalein solution was added and adjusted to 0.1molar KOH solution.

#### ❖ Saponification value Accurately weighed

One milliliter of the oil is precisely measured into a 250-milliliter conical flask, and then 10 milliliters of an ethanol:ether (2:1) mixture is added. Next, 25 milliliters of 0.5 N KOH alcoholic solution is dispensed into the flask. Allow the mixture to stand for 30 minutes, and titrate with 0.5 N HCl using phenolphthalein as an indicator. A blank titration without oil (sample) is conducted in the same manner. The quantity of KOH used is then calculated in milligrams.

#### ❖ pH

The pH of the medicated hair oil was determined using a pH meter. A common instrument used to measure pH is more accurate. This lab instrument is called a probe and meter, or at least a pH meter. The probe consists of a glass and a small electrode. The tension must pass. The meter, a voltmeter, measures the electronic resistance across a glass electrode and displays pH units instead. Volt pH meters are calibrated before using two liquid standard transducers of known pH. To measure It is created by immersing the probe in a liquid until a reading is registered on the meter.

#### ❖ Viscosity

The viscosity of the medicated hair oil was assessed utilizing Ostwald's viscometer.

### ❖ Specific gravity

Clean the specific gravity bottle with boiling water, dry it in the oven for 15 minutes, allow it to cool, cover it with a cloth, and then weigh it. Now fill one bottle of this specific weight with a test tube, cover with plastic wrap and weigh again. Select the weight of sample per millilitre.

### ❖ Sensitivity test:

The prepared Ayurvedic vegetable oil is applied on 1 cm of the skin of the hand and exposed to the sun for 4-5 minutes.

### ❖ Test for skin irritation:

The skin of the hind wings of the mice was deformed with the help of an electric shaver, followed by the application of a depilatory cream. Bare territory. It was kept visually for any irritation or erythema for the next 24 hours, and the same test was performed after application. Test samples on exposed areas except for extended periods of up to 48 hours<sup>12,13</sup>.

### Result and Discussion:

The result and discussion of the formulation and evaluation of herbal oil area s follows:

**Table 3: Result of parameters of Herbal hair oil**

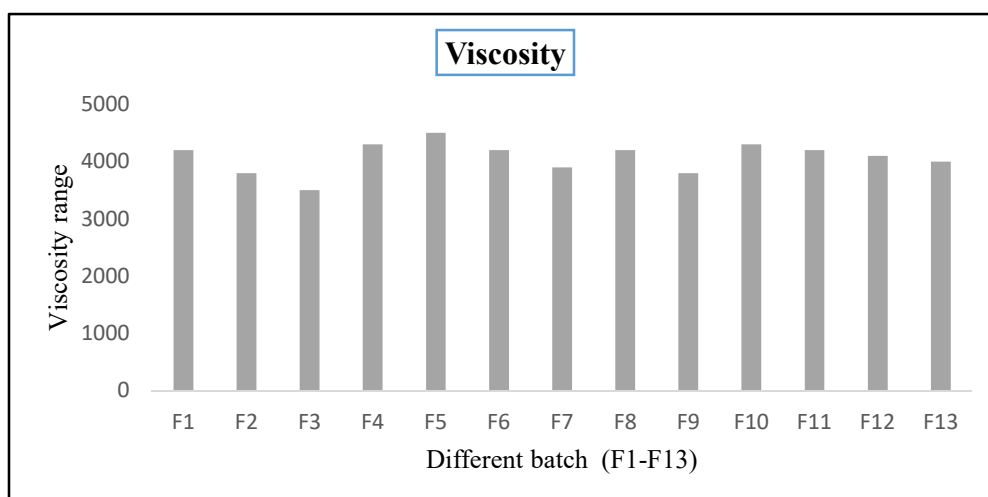
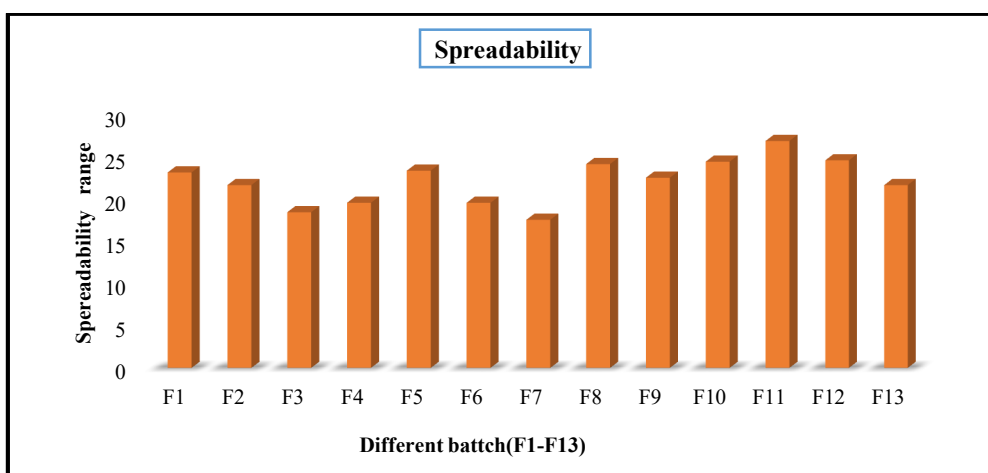
S.No	Parameters	Observation
1	Colour	Greenish brown
2	Odour	Odourless
3	Specific gravity	1.09
4	Viscosity	0.961poise
5	pH	6.8
6	Acid value	4.5
7	Saponification Value	111.2
8	Irritation Test	No irritation
9	Refractive Index	1.4

**Spreadability :** The prepared herbal-medicated hair oil had good spreadability, suggesting ease of application and even dispersion throughout the scalp. The spreadability rating was determined to be within acceptable limits, indicating a reasonable balance of oiliness and smooth application. This

characteristic improves user compliance and ensures that active herbal ingredients are effectively delivered to the scalp.

S. No	pH	Viscosity (Cp)	Spreadability (gm./S)
<b>F1</b>	6.73±0.014	4200	23.14±2.13
<b>F2</b>	6.42±0.017	3800	21.65±1.16
<b>F3</b>	5.43±0.016	3500	18.45±0.78
<b>F4</b>	7.33±0.012	4300	19.56±2.31
<b>F5</b>	6.81±0.021	4500	23.35±1.78
<b>F6</b>	6.42±0.011	4200	19.56±2.23
<b>F7</b>	5.32±0.020	3900	17.56±1.18
<b>F8</b>	6.83±0.019	4200	24.13±1.35
<b>F9</b>	7.68±0.011	3800	22.52±0.98
<b>F10</b>	6.58±0.025	4300	24.41±2.47
<b>F11</b>	5.12±0.010	4200	26.85±.80
<b>F12</b>	5.68±0.014	4100	24.57±1.74
<b>F13</b>	6.28±0.020	4000	21.65±2.34

**Table 4 : Different parameters of spread ability and viscosity of the herbal hair oil.**





**Figure 4 : Graphical representation of the viscosity and spreadability effects of prepared formulations.****Viscosity :**

The viscosity of the formulation was determined using a Brookfield viscometer which was determined to be moderate, indicating that the oil is neither too thick to impede application nor too thin to generate significant runoff. An optimum viscosity is required to ensure the product's consistency and stability while also guaranteeing proper absorption into the scalp. These results demonstrate that the formulation has the optimal rheological qualities suitable for topical hair oil treatments.

**Conclusion**

The current study effectively synthesised a herbal-medicated hair oil employing a blend of traditional medicinal herbs recognised for their hair care properties. The formulation showed favourable physicochemical parameters and was stable over the study period. Pharmacological testing indicated strong hair growth-promoting activity, as well as antibacterial and anti-dandruff properties, suggesting its promise for treating common scalp problems. The results support the therapeutic efficacy of the specified herbs, which provide a natural, cost-effective, and safe alternative to synthetic hair care treatments. More clinical trials are needed to prove its efficacy and expand its use in dermatology and cosmetics.

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