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"FORMULATION AND EVALUATION OF HERBAL HAIR OIL"

Vaibhav Hiralal Jadhav[1]*, Ganga Hanja Vasave[1*], Sonal Ravindra Pawar[1*], Suvarna Vasant Gorane[2*], Vaishali Dadaji Shewale[3*]

[1]Student, Nandurbar Taluka Vidhayak Samiti's Institute Of Pharmacy, Khodai Mata Road, Near GTP College Campus Road, Tal & Dist – Nandurbar (MS),India.

[2]Department Pharmacognosy, and Herbal and technology, Nandurbar Taluka Vidhayak Samiti's Institute of Pharmacy, Khodai Mata Road, Near GTP College Campus Road, Tal & Dist – Nandurbar (MS),India.

[3]Principal , Taluka Vidhayak Samiti's Institute of Pharmacy, Khodai Mata Road, Near GTP College Campus Road, Tal & Dist – Nandurbar (MS),India.

Corresponding Author :
Vaibhav Hiralal Jadhav*
Student, Nandurbar Taluka Vidhayak Samiti's Institute of Pharmacy, khodai Mata Road, Near GTP College Campus Road, Tal & Dist – Nandurbar(MS). India [425412]
City : Nandurbar
Country : India

Abstarct

Herbal formulations always have lesser or no side effects comparatively with synthetic. The aim of present study involves preparation of herbal hair oil using the herbal ingredients like, coconut oil, Bhringraj Leaves, Moringa leaves, Guava leaves, Mango leaves, Nilgiri leaves,Rosemary leaves, Aavaram Leaves. Based on the above observations, mixture of crude drugs was prepared in the form of herbal hair oil by boiling method. We have used five formulas using different herbal drugs and all the formulation are showing anti-hairfall property with some of other beneficial activities like anti-dandruff activity, improves blood circulation to the scalp and roots, reduce hair pigmentation, anti-fungal activity, reducing the whitening the hair.

The formulated herbal oil was evaluated by using various parameters such as Organoleptic properties, specific gravity, stability, viscosity, Acid value, pH etc. and the value obtained from it are found to be similar to that of the standard values like there is no sedimentation, no grittiness and shows satisfying organoleptic properties and the results were of determined and are reported in this work.

Keywords : Herbal hair oil, Natural oil, Hair growth, Hair fall, Scalp care, Plant leaves, Coconut oil, Hair nourishment.

1.INTRODUCTION

Human life is significantly impacted by hair.(1) The ancient method in India involves making hair oils and combining them with other medications that promote hair growth. Given that Indian women are recognized for having long, lustrous, and healthy hair, it is not unexpected that hair care plays a significant role in their self-care routines.

Oiling the hair and scalp is crucial for maintaining healthy hair and preventing hair loss, according to the Charaka Samhitha, the authoritative work on Ayurvedic medicine. It was advised to oil one's hair every day with the right herbs to suit other constituents, and this tradition has persisted to this day.

Hair oil formulations are used to cure split ends, various types of dandruff, and hair loss. The primary purpose of hair oil preparations is to cool the scalp so that both men and women can have rich hair development

Hair is an essential part of human existence. Hair care products are those that are used to wash, change the texture, change the color, rejuvenate stressed hair, nourish it, and make it look healthy. Hair oils are hair care solutions that address issues such as baldness, hair aggressiveness, hair discolouration, hair loss, and dryness.

The herbal hair oil formulation has significant quality and it provides various essential nutrients Used to maintain the normal functions of the sebaceous glands and promote the hair growth naturally. The traditional method in India involves making hair oils and mixing them with different medications that encourage hair growth. Given that.Indian women are renowned for having long, lustrous, and healthy hair, it is not unexpected that self-care rituals heavily emphasize hair maintenance.

fig no :01 all ingredients

Herbal hair oil not only moisturizes the scalp but also addresses dry scalp and hair conditions. It supplies essential nutrients necessary for the normal functioning of sebaceous glands and supports healthy hair growth. The plant extracts used in the oil are rich in flavonoids, polyphenols, saponins, tannins, vitamins, proteins, minerals, amino acid, and other beneficial compounds. These ingredients promote hair growth and provide numerous benefits for hair health.

Herbal hair oil strengthens hair and improves its texture. It gives sufficient hydration to the scalp, which aids with the elimination of dandruff. Regular application stimulates blood circulation in the scalp, which helps to heal damaged hair. It also reduces hydration fatigue, edema, and hair dryness. Furthermore, the oil protects hair follicles from surfactants by filling gaps between cuticle cells, which improves scalp health. Massaging the oil into the scalp encourages exfoliation, which can help prevent hair loss,

Various oils, including castor, almond, coconut, and onion oils, are combined with appropriate herbal remedies and administered directly to the scalp. Coconut oil is the most deserving oil basis since it permeates into hair strands more efficiently and at a lower cost. For the best hair development, coconut oil coupled with herbal medicines is the suggested way.[2]

There are different types of evaluation test for hair oils such as : [13]

- Acid value test

- Saponification test
- Viscosity
- Specific gravity
- Ph etc.

1. HAIR ANATOMY : [10]

Hair is a distinguishing feature of mammals that serves a variety of functions, including protection from environmental influences such as heat and cold. Hair, along with the sebaceous gland and sweat gland, is regarded as one of the body's most significant defensive appendages and integumentary structures.

1.1. Structure of hair:

- Hair consists of two parts:

Hair Follicle [5,6,7]

The Follicle is a structure in the skin that resembles a club. There can be a network of blood vessels at the top of the follicle that supply nutrients to nourish and promote hair growth. We refer to this as the papilla. Every follicle is the result of a communication between the dermis and epidermis. The folicle is segmented into three parts:

1. Infundibulum: extends from the follicle's surface opening to the sebaceous gland entrance level.

2. Isthmus: Extends from the infundibulum to the level of insertion of the arrector pilli muscle.

3. Inferior segment: The base of bulb is invaginated by a tuff of vascularized loose connective tissue called dermal papilla. The papilla of the hair contains many blood vessels and provides nourishment for hair growth

Hair Shaft :[5,6,8]

The hair shaft is divided into three layers:

1. Medulla: The medulla is the centre section of hair. It will either be continuous or doubled, or it will be divided or segmented.They are often packed with cells or resemble a hollow tube. The medulla is absent from the majority of hairs, but it might be broken or discontinuous in others. It creates the hair shaft's midsection. Particularly fine hairs typically lack this layer.

2. Cortex: The greatest portion of the hair shaft, or melanin (hair pigment), is what gives hair its colour.

3. Cuticle: The hair shaft's transparent outer coat may be called the cuticle. It is constructed from overlapping scales that shield the hair's inner layers. The hair's proximal end, which is closest to the scalp, and distal end are where the scales point.

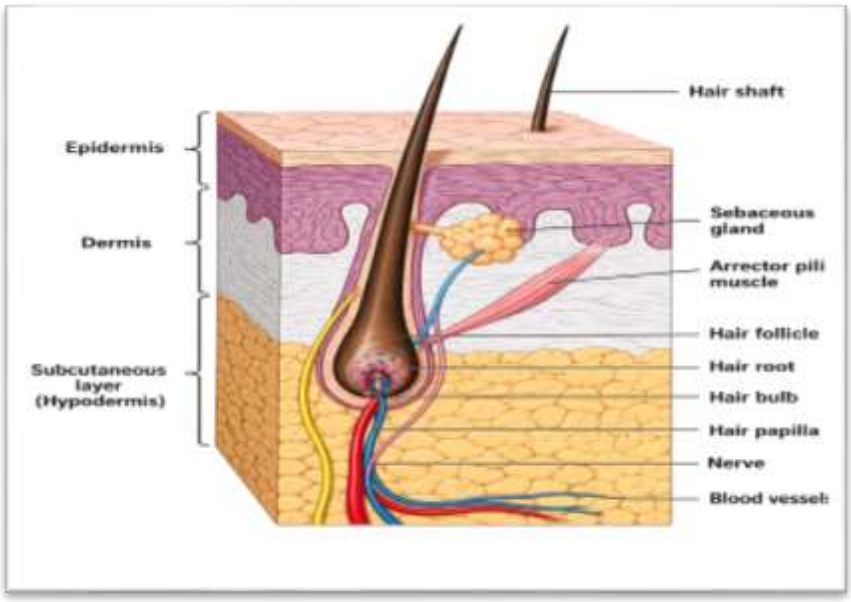

fig no : 02 structure of hair

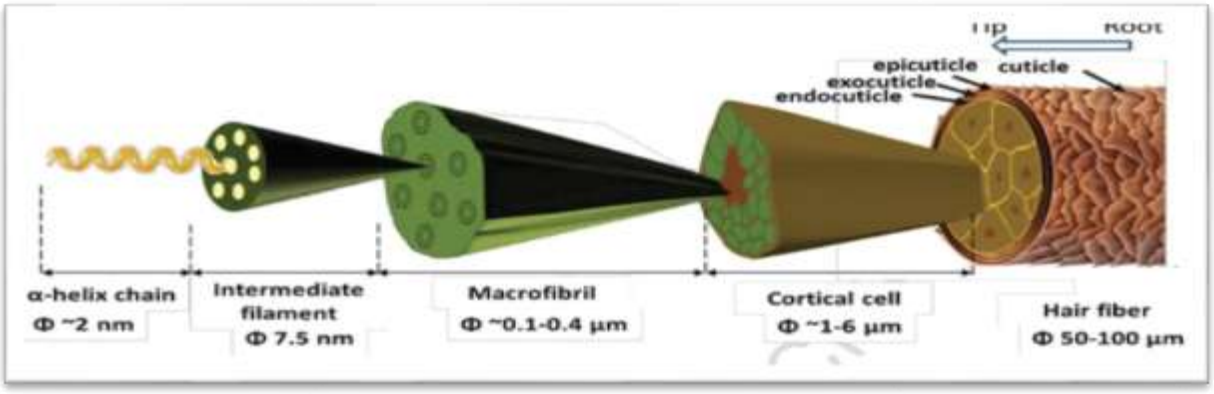

fig no : 03 structure of hair(hair fiber structure)

It shows the hierarchinal structure of hair from smallest to largest parts :

- α-helix chain
- Intermediate filament
- Macrofibril
- Cortical cell
- Hair fiber (with cuticle layers: epicuticle, exocuticle, endocuticle)

1. The basic part of hair is bulb, root and shaft.

2. Hair fall, dandruff, lice, Split end, grey hair are some of the well known problems related to hair.

3. A piece of hair looks simple but it is one of the most complicated structures in body. Hair is made up of two structures:

1.2. Hair types

Hair type is primarily based on the curl pattern of the hair, which is determined by the hair follicle. Genetics play a key role in determining hair type. Andre Walker, who has been Oprah Winfrey's stylist for decades, is credited with creating a system that

classifies hair into one of four curl patterns.

- Type 1: Straight
- Type 2: Wavy
- Type 3: Curly
- Type 4: Coily

1.3. Hair Growth Cycle [4]

Hair growth cycle consists of 3 stages: -

1. Anagen stage (Growth)

2. Catagen stage (Transition)

3. telogen stage (Rest)

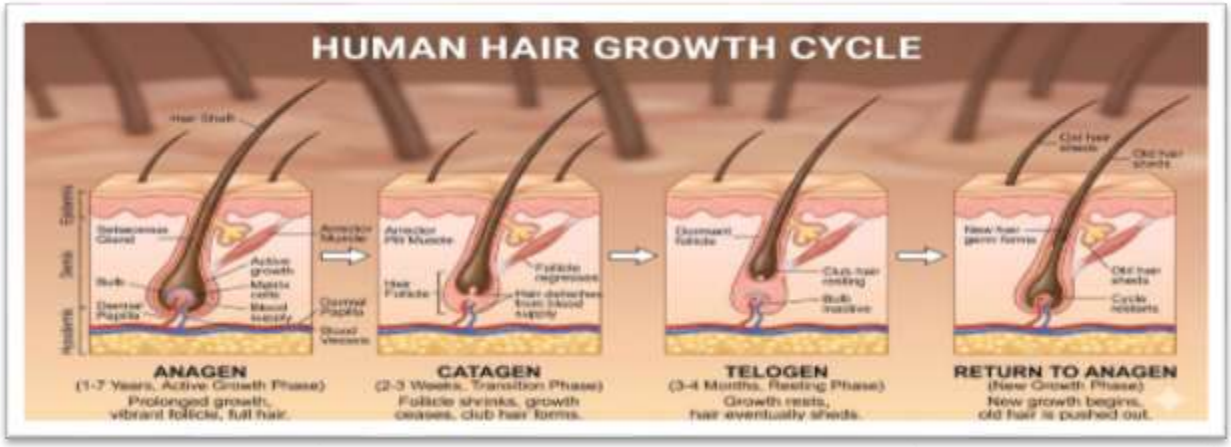

fig no : 04 hair growth cycle

1. HAIR OIL

Hair oil is a component of many hair care products. Hair care products are defined as compositions designed to wash, change the texture of hair, nourish hair, and maintain the appearance of healthy hair. Hair oils are hair care treatments that are applied to the hair to treat issues such as baldness, greying hair, hair loss, and dryness. They also help to feed the hair. Herbal cosmetics are in high demand due to people's growing interest in them, as well as the fact that their ingredients are easily accessible and their effectiveness is greater than that of their synthetic counterparts. Herbal hair oil is an essential ingredient in herbal cosmetics. Herbal hair oil is growing popular and desired for a variety of hair issues.

1.1 Different types of herbal hair oil available in market :

1. Coconut hair oil
2. Amla hair oil
3. Jasmine hair oil
4. Brahmi hair oil
5. Cantharidine hair oil
6. Onion hair oil
7. Bhringraj hair oil

1.2 Role of Herbal Hair Oil:

1. Provides comprehensive nourishment

Polyherbal hair oil supplies a wide range of nutrients from different herbs, which deeply nourish the scalp and hair roots.

2. Stimulates hair growth

The combined action of multiple herbal ingredients activates hair follicles and promotes faster,

thicker, and healthier hair growth.

3. Strengthens hair follicles

It improves the strength of hair from the roots, making it less prone to breakage and split ends.

4. Controls hair fall

By enhancing scalp health and root strength, polyherbal oil effectively reduces excessive hair loss.

Common hair diseases :

1. Dandruff
2. Alopecia (hair loss)
3. Scalp psoriasis
4. Seborrheic dermatitis
5. Head lice infestation
6. Fungal infections (ringworm of scalp)
7. Split ends
8. Hair breakage
9. Premature greying
10. Folliculitis

AIM AND OBJECTIVES :

AIM : To formulate and evaluate a herbal hair oil using selected medicinal plant leaves for enhancing hair growth, reducing hair fall, and improving overall scalp health through natural and safe ingredients.

OBJECTIVES :

1. To select suitable medicinal plant leaves for the preparation of herbal hair oil.
2. To collect and clean the plant materials properly before use.
3. To dry and process the leaves for extraction of active constituents.
4. To prepare the herbal hair oil using a suitable base oil (e.g., coconut oil).
5. To extract bioactive components from the plant leaves using heating or infusion method.
6. To formulate a stable and uniform polyherbal hair oil.
7. To study the role of each ingredient in hair care and scalp health.
8. To evaluate the organoleptic properties such as color, odor, and appearance.
9. To determine physicochemical parameters like pH and viscosity.
10. To check the spreadability and consistency of the prepared oil.
11. To assess the effectiveness in promoting hair growth.
12. To evaluate its action in reducing hair fall and dandruff.
13. To study the nourishing and conditioning effect on hair.
14. To ensure the formulation is safe and free from harmful chemicals.
15. To perform stability studies under different storage conditions.
16. To compare the prepared herbal oil with available commercial products (if required).
17. To develop a cost-effective and easy-to-prepare formulation.

PLAN OF WORK :

The plan of work is having following points :

- Selection of Polyherbal Ingredients
- To form Powder of Polyherbal Ingredients
- Evaluation of Powder Characteristics
- Selection of Oil For extraction
- Selection of Extraction Method
- Extraction of crude drug
- Preparation of Polyherbal Hair Oil

- Characteristics of Hair Oil
- Result and Dicussion
- Compilation of Data

Ingredients :

This polyherbal hair oil is a promising formulation for hair care, given the well-known benefits of the various herbs included. Here are the potential benefits of each ingredient:

1. COCONUT OIL

Kingdom : Plantae

Family : Arecaceae

Subfamily : Arecoideae

Tribe : Cocoseae

Genus : Cocos

Species : Cocos nucifera

Binomial name: Cocos nucifera

fig no : 05 coconut oil

USES :

- Used as vehicle
- Promote hair growth and moistures the hair follicles

2. BHRINGRAJ LEAVES

Kingdom : Plantae

Family : Asteraceae

Subfamily : Asteroideae

Tribe : Heliantheae

Genus : Eclipta

Species : Eclipta prostrate

Binomial name:Eclipta prostrata

fig no : 06 bhringraj leaves

USES :

- Promotes hair growth (hair tonic, nourishing property)
- Reduces hair fall (strengthening and revitalizing property)
- Controls dandruff (antifungal and antimicrobial property

3. MORINGA LEAVES

Kingdom : Plantae

Family : Moringaceae

Tribe : Moringeae

Genus : Moringa

Species : Moringa oleifera

Binomial name: Moringa oleifera

fig no : 07 moringa leaves

USES :

- Reduces hair fall (antioxidant and revitalizing property)
- Nourishes scalp (rich in vitamins and minerals)
- Controls dandruff (antimicrobial property)

3. GUAVA LEAVES

Kingdom : Plantae

Family : Myrtaceae

Subfamily : Myrtoideae

Tribe : Myrteae

Genus : Psidium

Species : Psidium guajava

Binomial name : Psidium guajava

fig no : 08 guava leaves

USES :

- Reduces hair fall (antioxidant and strengthening property)
- Controls dandruff (antimicrobial and antifungal property)
- Improves scalp health (anti-inflammatory property).

4. MANGO LEAVES

Kingdom : Plantae

Family : Anacardiaceae

Subfamily : Anacardioideae

Tribe : Anacardieae

Genus : Mangifera

Species : Mangifera indica

Binomial name: Mangifera indica

fig no : 09 mango leaves

USES :

- Promotes hair growth (nutritive and strengthening property)
- Reduces hair fall (antioxidant property)
- Improves scalp health (anti-inflammatory property)

5. NILGIRI LEAVES

Kingdom : Plantae

Family : Myrtaceae

Subfamily : Myrtoideae

Tribe : Eucalypteae

Genus : Eucalyptus

Species : Eucalyptus globulus

Binomial name : Eucalyptus globulus

fig no : 10 nilgiri leaves

USES :

- Promotes scalp health (antimicrobial and refreshing property)
- Controls dandruff (antifungal property)
- Reduces itching (anti-inflammatory and soothing property)

6. ROSEMARY LEAVES

Kingdom : Plantae

Family : Lamiaceae

Subfamily : Nepetoideae

Tribe : Mentheae

Genus : Salvia

Species : Salvia rosmarinus

Binomial name : Salvia rosmarinus

fig no : 11 rosemary leaves

USES :

- promote hair growth, improve blood circulation to the scalp
- And reduce hair fall
- It also helps in controlling dandruff and adding shine to hair.

7. AAVARAM LEAVES

Kingdom : Plantae

Family : Fabaceae

Subfamily : Caesalpinioideae

Tribe : Cassieae

Genus : Senna

Species : Senna auriculata

Binomial name : Senna auriculata

fig no : 12 aavaram leaves

USES :

- Promote hair growth
- Strengthen hair roots
- Improve scalp health.

Procedure :

1. Wash and shade-dry all leaves (remove moisture completely).

2. Crush or coarsely powder them.

3. Heat coconut oil using a double boiling method (avoid direct overheating).

4. Add all herbal materials into the oil.

5. Heat gently for 30-45 minutes until the oil absorbs herbal properties.

6. Cool and filter using muslin cloth.

7.Store in an airtight glass bottle.

fig no : 13 crushed or powdered

table no : 01 formulation batch for preparation of herbal hair oil

Sr.no	Ingredients	Quantity
1	Coconut Oil	40ml
2	Bhringraj Leaves	2g
3	Moringa Leaves	2g
4	Guava Leaves	2g
5	Mango Leaves	2g
6	Nilgiri Leaves	2g
7	Rosemary Leaves	2g
8	Aavaram Leaves	2g

fig no :14 oil making

Test:

Physical Evaluation

In the test, the herbal oil was observed for colour, odor, physical state, solubility, specific gravity, PH. viscosity, refractive index, acid value and saponification value. were determined manually.

1)Viscosity:

Viscosity is a measure of the resistance of a fluid which is being deformed by either stress or tensional stress. It canbe determined by following:-

Procedure

a) Thoroughly clean the viscometer.

b) Mount the viscometer in vertical position on a suitable stand.

c) Fill dry viscometer upto g mark.

d) Count the time required in seconds for hair oil sample to flow from mark A to B.

e) Repeat three times.

f) Determine the densities of the liquids.

2) Density:

Density of material is defined as its mass per unit volume. It is determined by following formula, Density= mass of oil / volume of oil in specific gravity bottle

3) Refractive Index:

The refractive index n, of a medium is defined as the ratio of the velocity e of a wave phenomenopn such aslight or sound in a reference medium to the phase velocity, Vp in the medium itself.

4) Colour

To check prepare herbal hair oil colour

5) Odour

To Observe Prepare Herbal Hair Oil Odour

6) PH

The PH Of Herbal Oil Determination of Using PH Meter

Chemical Evaluation

1) Acid value:

Acid value is the mass of potassium hydroxide in milligrams that is required to neutralize one gram of chemical substance. The acid number is a measure of the amount of carboxylic acid groups in a chemical compound, such as fatty acid, or in a mixture of compounds. The acid number is used to quantify the amount of acid present, in a oil sample. It is the quantity of base, mexpressed in milligrams of potassium hydroxide that is required to neutralize the acidic constituents in 1 gm of sample

Procedure:-

a) Weigh accurately 0.5 gm of acid sample; add it to a mixture of 10 ml of alcohol and 10 ml of ether. If acid does not dissolve in a solvent mixture, warm it on water bath until it dissolves.

b) Titrate solution of acid against 0.1 N sodium hydroxide and phenolphthalein as the indicator.

c) Carry out blank titration by omitting the substance.

d) Take readings and calculate acid value using formula.

Acid value 5.61 x n/w.

Where, n= no. of ml of 0.1 N NaOH required. W=weight of substance in gm.

fig no :15 acid value

2) Saponification Value:

Saponification is the number of milligrams of potassium hydroxide or sodium hydroxide required to saponify 1 gram of oil under specific conditions. It is a measure of the average molecular weight of all fatty acids present. Long-chain fatty acids found in fat have a low saponification value because they contain relatively few nitrogen atoms. Carboxyl functional groups per unit mass of fat compared to short-chain fatty acids. If more bases are required to saponify N grams of fat, the number of moles of fat will be greater and the chain length will be relatively shorter.

Procedure:

1. Weigh about 2 g of the substance being examined in an iodine flask fitted with reflex condenser.

2. Add 25 ml of 0.5 M ethanolic potassium hydroxide solution and boil under reflux on water bath for 30 minutes.

3. Remove the condenser and add 1 ml of phenolphthalein solution and titrate immediately with 0.5 M Hydrochloric acid. Note the reading as 'a'.

4. Repeat the operation omiting the substance being examined. Note the reading as 'b'.

5. Calculate the saponification value from the following equation

Saponification value = (b-a) x 28.05/weight of substance

Saponification values were determined and the Formulations were subjected to biological evaluation.

fig no : 16 test of saponification value

Biological evaluation

1) Primary Skin Irritation Test:

The prepared formulations were assessed for primary skin irritation test. Six healthy rats wereselected for the study. Each rat was caged individually food and water given during the test period 24 hrs prior to the test. The hair from the back of each rat of 1cm2 was shaved on the side of the spine to expose sufficiently large test areas, which could accommodate three test sites were cleaned with surgical sprit. Measured quantity (1ml) (5% w/w) of the formulations ODI, OD2 and OD3 were applied over the respective test sites on one side of the spine and observed for erythema and edema for 48hrs after application.

2) Sensitivity Test

The Prepare Herbal Oil Was Applied 1 Cm On skin Of hand Exposed To Sunlight For 4-5 Min

OIL BOTTEL

fig no :17 oil bottel

table no : 02 evaluation of herbal hair oil

Sr no	Parameters	Observation
1	State	Liquid
2	Colour	Greenish Brown
3	Odour	Herbal aroma
4	pH	6 - 7
5	Primary Skin Irritation Test	Non irritant
6	Sensitivity Test	Non Sensetive

Result and discussion :

The herbal hair oil was prepared with combination of coconut oil and many herbs ingredient like , Bhringraj Leaves, Moringa Leaves, Guava Leaves, Mango Leaves, Nilgiri Leaves, Rosemary Leaves, Aavaram Leaves.In respect of physiochemical properties, the prepared formulation was greenish brown in colour with pH 6-7 in accordance with humann skin pH 6.8 was neutral to slightly acidic.

Conclusion :

The formulated herbal hair oil containing Mango leaves, Guava leaves, Rosemary leaves, Bhringraj leaves, Moringa leaves, Coconut Oil, Nilgiri leaves, and Aavaram leaves demonstrated promising properties for hair care and scalp nourishment. The combination of these herbal ingredients provides a rich source of antioxidants, vitamins, minerals, and bioactive compounds that may help promote hair growth, reduce dandruff, strengthen hair roots, and improve overall scalp health.

Overall, the study concludes that the formulated herbal hair oil is a natural, safe, and economical preparation with potential benefits for maintaining healthy hair and scalp conditions. Regular use of this herbal formulation may help in reducing hair fall, improving hair texture, and enhancing hair growth without the side effects commonly associated with synthetichair products

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