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Formulation and Evaluation of Composite Herbal Hair Oil

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ABSTRACT

Herbal formulations are considered to have been used since ancient times with minimal side effects and increased behaviour due to their sources. Present work aims to formulate composite herbal hair oil from the flowers & leaves of *Hibiscus Rosa sinensis*, roots of *Vetiveria zizanioides*, leaves of *Lawsonia inermis*, *Azadirachta indica*, *Punica granatum* and *Bacopamonnieri*, leaves & seeds of *Trigonella foenugraecum*, fruits of *Embelica officinalis*, leaves of *Murraya koenigii*. The evaluation of formulated composite herbal hair oil was carried out for various parameters such as organoleptic properties, sensitivity test, specific gravity, pH, viscosity, density, acid value, saponification value, antioxidant and stability studies. The Antioxidant activity of the oil was studied by DPPH radical scavenging method. All the parameters were found to be better and within the standards. The second concentration (6 gm) of the three concentrations of prepared composite herbal hair oil showed better results than the other two concentrations. As the values in the evaluation of formulated hair oil were found to be within the acceptable limits, it was concluded that the oil is beneficial in maintaining healthy hair growth, turning grey hair to black, providing dandruff protection, and results in lustrous looking hairs.

INTRODUCTION:

Hair is an epidermal derivative that enhances the overall beauty of the body as one of the key components. Hair fall, dandruff, lice, spilt ends, grey hair are just a few issues facing human hair. Human beings take several attempts to resolve these by adding several cosmetics to each of them. One of them used to solve almost all of these problems is hair oil.

Hair is a protein filament that grows from follicles found in the dermis. Hair is one of the defining characteristics of mammals. The human body, apart from areas of glabrous skin, is covered in follicles that produce thick terminal and fine vellus hair. The most common interest in hair is focused on hair growth, hair types, and hair care, but hair is also a most important biomaterial primarily composed of protein, notably alpha-keratin[2, 3].

Hairfall is a common issue that can be caused by inheritance, changes in hormones, medical conditions, or a natural part of aging. Anyone can lose hair on their head, but it's more common in men. Baldness typically refers to excessive hair loss from the scalp. Hereditary hair loss with age is the most common cause of baldness.

Hair loss is a distressing condition for a larger number of men and women. Thus it is of great importance to developing new products for the effective treatment of hair loss. Many herbal hair oils have been formulated to date, of which very few are reported to show maximum activity. Our present work is mainly focused on the formulation of new composite herbal hair oil which acts mainly as a hair growth stimulator promoting healthy and lustrous hair growth.

Plant profile[1]:

1. Hibiscus leaves and flowers:

Figure No.1: Hibiscus leaves and flowers

Biological source: Hibiscus *H. rosa-sinensis, Malvaceae*

Part used: leaves and flowers

Uses:

- Hibiscus-infused oil can help boost hair growth.
- It is rich in amino acids that nourish your hair, strengthen your roots, and keep your locks lustrous and healthy.
- The flower stimulates hair regrowth from dormant follicles and bald patches.
- Prevents premature hair graying by reducing excessive body heat.
- Stimulates blood circulation on the scalp.
- Supplies essential nutrients to the hair follicles.

2. Pomegranate leaves:

Figure No.2: Pomegranate leaves

Biological source: *Punica granatum, Lythraceae*

Part used: Dried leaves

Uses:

- Pomegranate leaves are packed with antioxidants that make hair follicles stronger.
- It improves blood circulation in the scalp – a factor that helps to stimulate hair growth.

3. Neem leaves

Biological source: *Azadirachta indica, Meliaceae*

Part used: Dried leaves

Uses:

- It is an effective herb to treat hair loss.

- Due to its antibacterial, antifungal, and anti-inflammatory properties, neem is an excellent way to curb dandruff.
- It helps the hair follicles to become stronger and also encourages hair growth.

4. Brahmi leaves

Figure No.3: Brahmi leaves

Biological source: *Bacopamonnieri, Scrophuariaceae*

Part used: Dried leaves

Uses:

- Brahmi helps to provide strength and nourishment through the scalp, strengthening the blood vessels; thus, oxygen and nutrients stimulate hair growth and prevent hair loss.
- The alkaloids in Brahmi bind to the proteins in the hair shaft producing stronger and thicker hair.

5. Curry leaves:

Figure No.4: Curry leaves

Biological source: *Murraya koenigii, Rutaceae*

Part used: Dried leaves

Uses:

- Curry leaves are a rich source of beta-carotene and proteins, which can reduce hair loss and increase hair growth.
- They also contain amino acids and antioxidants which strengthen the hair follicles and moisturize the scalp.
- Curry leaves also help to remove the dead hair follicles, which can be the reason behind dandruff.

6. Henna leaves:

Figure No.5: Henna leaves

Biological source: *Lawsonia inermis, Lythraceae.*

Part used: Dried leaves

Uses:

- As hair dye
- Maintains Scalp Health. Henna has a cooling effect on the scalp.
- Balances PH levels and Oil production.
- Curbs Hair Fall and Boosts Hair Growth.
- Strengthens and Repairs Hair.
- Conditions Hair.

7. Fenugreek seeds and leaves:

Figure No.6: Fenugreek seeds and leaves

Biological source: *Trigonella foenum-graecum, Leguminosae*

Part used: Dried seeds and leaves

Uses:

- Reduces dandruff: The antifungal and moisturizing properties of fenugreek benefits to lessen the dryness of the scalp.
- Promotes healthy hair growth.
- Adds shine and glossy nature to hair.

8. Amla:

Figure No.7: Amla fruits

Biological source: *Phyllanthus emblica, Phyllanthaceae*

Part used: Dried fruits

Uses:

- Amla, like curry leaves, is a proven tonic for hair. It slows down graying, prevents dandruff, strengthens hair follicles, and increases blood circulation to the scalp thereby improving hair growth.
- Amla also acts as a natural conditioner giving you soft shimmering locks.

9. Vetiver roots:

Figure No.8: Vetiver roots

Biological source: Vetiveria zizanioides, Graminae/Poaceae

Part used: Dried roots

Uses:

- Blessed with anti-microbial properties, it improves blood circulation in the hair follicles, prevents various hair infections and replenishes collagen formation, and bring hair back to life.
- It is extremely useful for rejuvenating dull, lifeless hair.
- Regular use of the oil having vetiver roots improves hair texture, adds shine, and stimulates hair growth.

Base oil/Ghana coconut oil:

Figure No.9: Oil extraction machine

Biological source: *Cocus nucifera, Arecaceae*

Part used: Kernel

Uses: The raw material for hair oil and hair tonic, moisturizer

Base oil or carrier oil plays an important role in carrying and diluting highly concentrated essential oils. It helps in spreading the oil easily and evenly over the skin thus promoting quick absorption into the skin dermal layers. Ghana coconut oil will be the ideal base oil.

MATERIALS AND METHODS

Collection of Plant Material: The flowers & leaves of *Hibiscus Rosa sinensis*, roots of *Vetiveria zizanioides*, leaves of *Lawsonia inermis*, , *Azadirachta indica*, *Punica granatum* and *Bacopamonnieri* were procured from the medicinal garden of Sree Siddaganga College of Pharmacy. The leaves & seeds of *Trigonella foenugraecum*, fruits of *Embelica officinalis*, leaves of *Murraya koenigii* were procured from the local market [(4)].

Experiment method: The various parts of plant drugs were collected and shade dried to retain the active constituents. Dry plant drugs were compressed into a coarse powder in a blender and then eventually mixed into a uniform mixture. All the contents (3 gm, 6 gm, and 9 gm) were boiled in Ghana coconut oil for 15 minutes and filtered using a muslin cloth. Finally, all the three concentrations were made up to 100 ml using Ghana coconut oil as base oil. Tea tree oil is added as a flavouring agent which also acts as a preservative and the prepared oil was stored in amber colored bottle [(5, 6)].

Table No.1: List of ingredients used for composite herbal hair oil preparation

Sr.NO	Ingredients	3%	6%	9%
1	Hibiscus leaves and flowers	3 gm	6 gm	9 gm
2	Pomegranate leaves	3 gm	6 gm	9 gm
3	Neem leaves	3 gm	6 gm	9 gm
4	Brahmi leaves	3 gm	6 gm	9 gm
5	Curry leaves	3 gm	6 gm	9 gm
6	Henna leaves	3 gm	6 gm	9 gm
7	Fenugreek seeds	3 gm	6 gm	9 gm
8	Fenugreek leaves	3 gm	6 gm	9 gm
9	Amla fruit	3 gm	6 gm	9 gm
10	Vetiver roots	3 gm	6 gm	9 gm
11	Tea tree oil	1 drop	1 drop	1 drop
12	Coconut oil	Up to 100ml	Up to 100ml	Up to 100ml

Evaluation of Composite Herbal Hair Oil:

The formulated composite herbal hair oil was evaluated for parameters such as organoleptic parameters, sensitivity test, pH, specific gravity, density, viscosity, acid value, saponification value.

Organoleptic property: Different organoleptic properties like Colour, physical state, odour of the formulated composite herbal hair oil in three different concentrations were determined manually.

pH: The pH of composite herbal hair oil was determined by using a pH meter.

Acid value: 10 ml of composite herbal hair oil was added with 25 ml of ethanol and 25 ml of ether. Phenolphthalein was added as an indicator and titrated with standardized 0.1N potassium hydroxide solution [7, 8].

$$\text{Acid value} = \frac{56.1 \times N_{KOH} \times \text{Burette Reading}}{\text{Weight of the sample}}$$

Saponification value: 2 gm of composite herbal hair oil was accurately weighed and transferred into a 250 ml RB flask and 25 ml of 0.5 N alcoholic KOH was added. The mixture was refluxed for one hour and the flask was cooled. The cooled solution was titrated

against standardized 0.5 N HCl using phenolphthalein indicator. Similarly, the blank titration was performed without taking oil (sample). The amount of KOH in mg used was calculated.

$$\text{Saponification value} = \frac{(\text{Blank-Sample}) \times N_{HCl} \times 28.05}{0.5 \times \text{Weight of the sample}}$$

Density: The density of three concentrations of the composite herbal hair oil was determined by the density bottle method using the following formula

$$\text{The density of oil} = \frac{\text{Weight of oil}}{\text{Weight of water}} \times \text{Density of water at lab temperature.}$$

Viscosity: It is an index of resistance of a liquid to flow, the higher the viscosity of the liquid, the greater is the resistance to flow. The viscosity was determined by using Ostwald's Viscometer.

$$\text{Viscosity of the oil} = \frac{\text{Density of oil X time taken for oil (sec)}}{\text{Density of water X time taken for water (sec)}} \times \text{Viscosity of water (lab temp)}$$

Specific gravity[9]: Specific gravity bottle was taken, rinsed with distilled water, dried in an oven for 15 minutes, and cooled. The empty specific gravity bottle with the stopper was weighed (a). Then, the same specific gravity bottle was filled with the sample, closed with the stopper, and again weighed (b). The weight of the sample was determined by subtracting the weights (b-a).

$$\text{The specific gravity of composite herbal hair oil} = \frac{\text{Density of oil}}{\text{Density of water}}$$

Antioxidant activity [10]:

DPPH radical scavenging test: The DPPH assay is a simple, rapid, and widely used method to evaluate antioxidant activity.

1 ml of composite herbal hair oil solutions (3g, 6g, 9g) of five concentrations (20, 30, 40, 50 and 60 µg/ml in acetone) was added to one ml of DPPH solution (0.2mM in acetone). After 30 min of reaction at room temperature, the absorbance of the solution was measured at 517 nm. The Antioxidant activity of the composite herbal hair oil is measured against ascorbic acid as standard**.**

$$\% \text{ Inhibition} = \frac{\text{Absorbance}_{(control)} - \text{Absorbance}_{(sample)}}{\text{Absorbance}_{(control)}}$$

Stability studies: After the chemical analysis the formulated composite herbal hair oil of three concentrations was kept in a glass container at room temperature. The same composite herbal hair oil was again tested after the stipulated period.

RESULTS AND DISCUSSION

Organoleptic properties: The prepared composite herbal hair oil was checked for its physical properties and the results are as below.

Colour: Dark greenish brown color.

Physical state: Viscous liquid with greasy in nature.

Odour: Characteristic of their constituents.

Grittiness: Composite herbal hair oil of three concentrations was smooth without any gritty particles.

Table No.2: Physical evaluation of Composite herbal hair oil

Sr.NO	Parameter	3g	6g	9g
1	Density (g/ml)	0.9189	0.9114	0.9074
2	Viscosity (centipoise)	0.2141	0.2477	0.2818
3	Specific gravity	0.9189	0.9114	0.9074
4	P^H	6.8	5.3	5.1
5	Acid value	0.4836	1.2090	2.4179
6	Saponification value	314.47	311.64	317.30

Antioxidant activity of composite herbal hair oil was studied by the DPPH method and results are shown in Table No.3.

Table No.3: Antioxidant activity of Composite herbal hair oil (3 gm)

Sr.No.	Drug With Methanol Concentrations(µl/ml)	Absorbance	% Radical Scavenging Activity
3_1	20	0.318	27.2
3_2	30	0.410	64.0
3_3	40	0.420	70.5
3_4	50	0.461	84.4
3_5	60	0.510	96.2
Control		0.25	

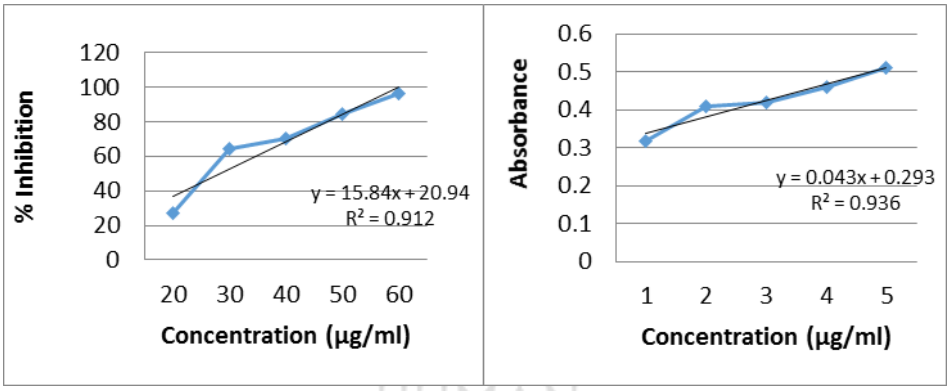
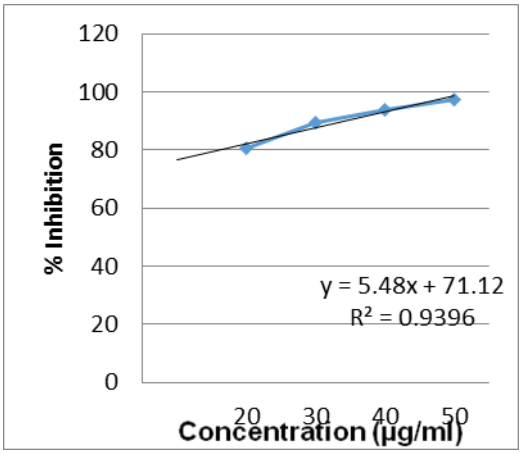


Figure No.1a **Figure No.1b**

Effect of Composite herbal hair oil- 3gm on DPPH Scavenging activity

Table No.4: Antioxidant activity of Composite herbal hair oil (6 gm)

Sr.No.	Drug With Methanol Concentrations(µl/ml)	Absorbance	%Radical Scavenging Activity
6_1	20	0.451	80.4
6_2	30	0.474	89.6
6_3	40	0.485	94
6_4	50	0.493	97.2
6_5	60	0.513	105.2
control		0.25	



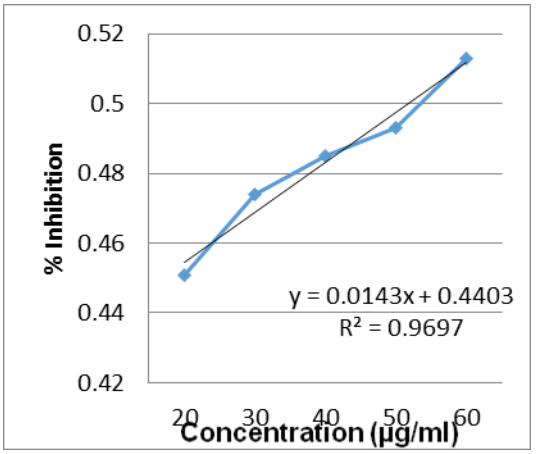
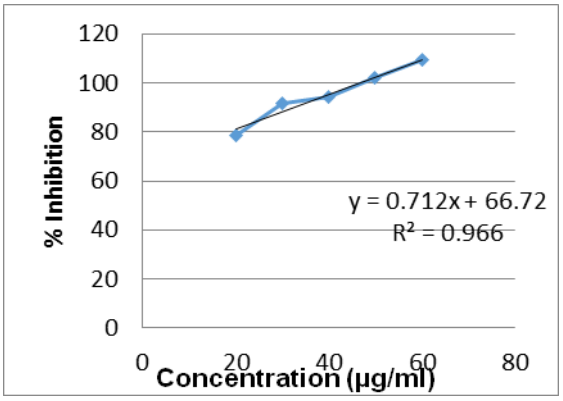


Figure No.2a **Figure No. 2b**

Effect of composite herbal hair oil- 6gm on DPPH Scavenging Activity

Table No.5: Antioxidant activity of composite herbal hair oil (9 gm)

Sr.No.	Drug With Methanol Concentrations(µl/ml)	Absorbance	%Radical Scavenging Activity
9_1	20	0.447	78.8
9_2	30	0.479	91.6
9_3	40	0.486	94.4
9_4	50	0.505	102
9_5	60	0.523	109.2
control		0.25	



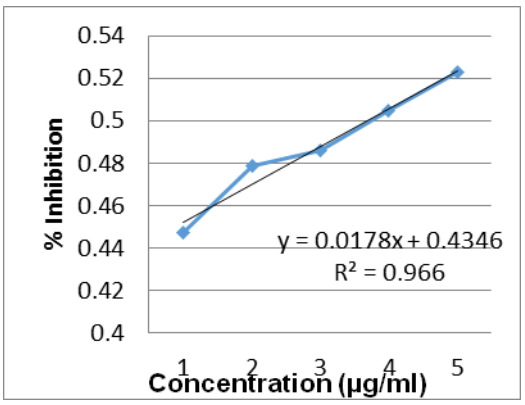


Figure No.3a **Figure No.3b**

Effect of composite herbal hair oil- 9gm on DPPH Scavenging Activity

Stability: Physical evaluation after 90 days stored formulated composite herbal hair oil, was found to be dark green colour, density, viscosity, saponification value, acid value were found to be almost same with little variations in acid value and saponification value (± 3 points). Thus the stability study of the formulation, physical and chemical parameters almost remained unchanged after three months of preparation.

CONCLUSION:

All the parameters showed that they were within the limits and all the ingredients added have many advantages. The herbal constituents like Hibiscus leaves and flowers makes the hair soft and lustrous, henna leaves gives cooling effect and colour, amla fruits act as natural hair conditioner, curry leaves strengthen the hair follicles and promotes hair growth, bramhi leaves strength and nourishment, methi leaves and seeds show antidandruff activity, neem levaes show antifungal and antibacterial properties. Overall, the composite herbal hair oil prepared with all these ingradients will help in maintaining healthy hair growth, turning grey hair to black, protects against dandruff, and results in lustrous looking hair. Hence, this formulation will be proved to be safer for human use.

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