



Research Article

Formulation & Evaluation Of Anti Dandruff And Anti Greying Polyherbal Hair Oil

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ABSTRACT

Recent years have seen a general public shift towards the widespread usage of herbal cosmetics, perhaps due to their perceived lower risk and improved safety and security profile. In this research, a polyherbal hair oil formulation containing twelve herbal ingredients including amla, hibiscus, curry leaves, bhringraj, lemongrass, tulsi, guava leaves, neem, licorice, and camphor is developed and evaluated in order to treat dandruff and prevent greying of hair. The main objective of this study is to formulate polyherbal hair oil. Combinations of amla, hibiscus, camphor, and bhringraj are known to prevent premature greying, while tulsi, bhringraj, guava, and curry leaves are said to offer anti-dandruff properties. In addition to moisturising hair, castor oil offers anti-inflammatory qualities. The significance of using herbal hair oil for hair treatment issues such as grey hair and dandruff is the main emphasis of this study. Synthesised hair oil was assessed for its organoleptic characteristics, pH, sensitivity test, primary skin irritation test, saponification value & refractive index. Every parameter was judged to be satisfactory and within the acceptable range.

INTRODUCTION

One of the most important bodily components, hair is formed from the skin's ectoderm. It is a protective appendage and, together with nails and sebaceous glands, is an accessory structure of the integument. Because they begin in the epidermis during embryonic development, they are often referred to as epidermal deriat.¹ Dermal follicles produce protein filaments that develop into hairs. Among the features of animals is hair. The most

popular topics of interest when it comes to hair are hair types, growth, and maintenance, but hair is also a very significant biomaterial made primarily of proteins, particularly alpha-keratin. In addition to moisturising the scalp, vegetable oil improves the condition of dry hair and scalp. This offers a variety of vital nutrients that support healthy hair growth and preserve the sebaceous glands regular operation. Flavonoids, polyphenols, saponins, tannins, vitamins, proteins, minerals, and

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ricinoleic acid, among other highly concentrated plant parts, are utilised. Additionally, these components offer numerous advantages for hair health and aid in hair development. Herbal hair oils aid in improving the structure and strength of the hair. Additionally, it gives the scalp a lot more moisture, which helps to relieve dandruff. Damage in the hairs can be improved by applying oil as it improves increasing blood circulation in the scalp. Regular hair oiling also helps to minimise moisture exhaustion from hair. Additionally, it fills the void left by cuticle cells, safeguards follicle surfactants, and promotes scalp health.² The main issues with hair care include decreased pigmentation and greying, split ends, dandruff, and hair loss that causes early balding. A number of variables, primarily genetics, contribute to hair loss, greying, and other diseases.³ Hence, in order to address these problems, polyherbal hair oils are made with a variety of substances, including licorice, amla, camphor, neem, curry leaves, hibiscus, tulsi leaves, amla, lemongrass, and bhringraj. Since no hair oil had previously been made using these plants together, the components of polyherbal oil were chosen for the creation of polyherbal hair oil.

1. AMLA



Fig 1: Amla

It is obtained from dried and fresh fruit of *Phyllanthus emblica*. It goes under another name of gooseberry, Amla, Amalaka belongs to the family *Phyllanthaceae*. It provides an excellent

supply of vitamin C that helps to boost your immunity. It also helps for strengthening the scalp and hair and reduces premature pigment loss from hair graying. It also prevents or treats dandruff, and dry scalp. It is used for various hair care products. Amla fortifies hair follicles, keeps hair colour vibrant, and delays the onset of graying.^{4,5} The fruit extract helps prevent hair loss and promote hair growth.⁶

BHRINGRAJ



Fig 2 : Bhringraj

It is derived from the aerial portions of the Asteraceae family plants *Eclipta prostrata* and *Eclipta alba*. Bhringraj has the potential to stop hair greying, dandruff, and hair loss. It increases the flow of blood to the hair follicles.⁷

2. CAMPHOR



Fig 3: Camphor

Laurel wood from camphor trees (*Cinnamomum camphora*) is distilled to produce it. There are several applications for camphor. It can be used as a muscle rub to cure colds, headaches, and coughs. It can also be used as a hair massage oil to

stimulate hair growth and prevent fungal infections on the scalp.⁸

3. HIBISCUS



Fig 4: Hibiscus

It comes from the newly opened petals of Hibiscus rosa sinensis belongs to the family Malvaceae. It aids in fortifying your hair's roots.⁸ Anthocyanins and phenolics, minerals including calcium, phosphorus, and iron, as well as vitamins B1, riboflavin, niacin, and C, are abundant in hibiscus leaves and flowers. These compounds stimulate and encourage thicker hair development and delay the onset of premature greying of hair. ⁹The phytosterols, flavanoids, and triterpenoids in floral extract are good for hair development. It adds volume, thickens hair, delays the onset of grey hair, and slows hair loss.¹⁰

4. NEEM



Fig 5: Neem

It's obtained from the dried or fresh leaves of Azadirachta indica of the family Meliaceae. It has a variety of benefits on both skin and hair, mainly it has anti-inflammatory and anti-fungal properties.¹¹ Neem helps to clean the scalp. It

increases hair growth and unclogs congested pores. For the treatment of dandruff, the regeneration qualities are very important.¹² It has therapeutic and antibacterial qualities and it can be used for a variety of hair problems.¹³

5. TULSI



Fig 6: Tulsi

Tulsi or holy basil is used for religious works from ages. It supports healthy blood circulation and maintains scalp equilibrium, which lessens irritation and dandruff and encourages hair development. It is applied as a paste to prevent dandruff and maintain clean scalp roots.^{14,15}

6. CASTOR OIL



Fig 7: Castor oil

The primary source of oil worldwide is a plant called Ricinus communis, which grows in all tropical and subtropical regions. Toxic ingredient ricin, which causes oil to go rancid, is taken out of the oil by filtering and steaming it.¹⁶ Castor oil is popular as hair oil, with the following actions^{16,17} Moisturizing effect – Ricinoleic acid and its derivatives present in the oil have moisturizing property.

Nourishing effect – It has been suggested that the fatty acids give the hair follicle sustenance due to their excellent penetration. Germicidal and fungicidal effect – The oil's ricin and ricinoleic acid help to shield the hair scalp from microbial and fungal illnesses. In androgenetic alopecia – It has been demonstrated that ricinoleic acid can permeate skin and inhibit prostaglandin D2 synthase (PGD2) in cases of androgenetic alopecia. In addition to sharing a two-dimensional structure with the prostaglandin family, ricinoleic acid has also been shown to have some effect on hair development.

7. SESAME OIL



Fig 8: Sesame Oil

In India, it's also referred to as til oil. To extract oil, *Sesamum indicum* seeds are pressed.¹⁸ The compounds found in oil of til include arachidic acid, stearic acid, behenic acid, gandleic acid, oleic acid and linolenic acid. Sesamol, Sesaminol, and Sesamin are present in considerable concentrations. Sesamol gives the oil stability. Sesame lignans are also present.¹⁹ Tocopherol + tocotrienol + sesamin extract has been shown in a rat research to considerably prevent UV-induced damage.²⁰ It prevents damage to the hair by forming a protective covering around it. In addition to preventing dryness, til oil hydrates hair follicles & decreases hair greying.^{21,22}

8. Guava



Fig 9: Guava

Guava (*Psidium guajava*) is a well-known tropical tree grown in tropical areas that are widely cultivated for fruit.²³ The leaves are also rich in Vitamin B & C that helps in nourishing hair and also aids hair growth. As it has contents which give effects such as antimicrobial, anti-inflammatory, antioxidant which helps to relieve hair fall problem and strengthen the hairs.²⁴

9. Curry Leaves



Fig 10: Curry leaves

It is extracted from *Murraya koenigii* leaves. Proteins and beta-carotene found in abundance in curry leaves can both stop hair loss and encourage the growth of hair.²⁵

10. LIQUORICE



Fig 11: Liquorice root

It is obtained from the root of *Glycyrrhiza glabra*. Licorice calms the scalp and gets rid of irritants like scabs and dandruff. It has calming qualities, facilitates pore opening, and is excellent for the hair shaft.²⁶

11. Lemongrass



Fig 12: Lemongrass

The largest significant producer of essential oils within the *Cymbopogon* genus is lemongrass. It is

used in fragrances, cosmetics, perfumes, soaps, detergents, toiletries, pharmaceutical industries etc. Oil of lemon grass exhibits anti-fungal qualities, aids in hair nourishment, functions as a natural conditioner, and encourages hair development.²⁷

MATERIALS AND METHOD



Collection of plant materials







A range of plant materials, including Indian gooseberry, curry leaves, tulsi leaves, neem leaves, guava leaves, hibiscus flowers, bhringraj leaves, and lemongrass, were gathered from the herbal garden of Devsthali Vidyapeeth College of Pharmacy, Lalpur, for the preparation of herbal hair oil. Local market purchases included licorice root, sesame oil, castor oil, and camphor.




Table 1: Ingredients used in formulation

Sr. No	INGREDIENTS	BOTANCIAL NAME	PART USED
1.	Amla	<i>Phyllanthus emblica</i>	Fruit
2.	Hibiscus	<i>Hibiscus rosa sinensis</i>	Flower
3.	Curry plant	<i>Muraya koenigii</i>	Leaves
4.	Bhringraj	<i>Eclipta alba</i>	Root
5.	Lemongrass	<i>Cymbopogon citrate's</i>	Leaves
6.	Tulsi	<i>Ocimum tenuiflorum</i>	Leaves
7.	Guava	<i>Psidium guajava</i>	Leaves
8.	Neem	<i>Azadirachta indica</i>	Leaves
9.	Liquorice	<i>Glycyrrhiza glabra</i>	Root

Table 2: Uses of ingredient used in formulation

Sr. No	Ingredients	Use of ingredients	Uses
1	Castor oil	Moisturizing and nourishing effect	
2	Sesame oil	Anti-inflammatory and antioxidant effect	

3	Hibiscus	Prevents premature graying	
4	Curry leaves	boost hair growth and remove dead hair follicles	
5	Bhringraj	Antidandruff and anti greying	
6	Lemongrass	Fragrance	
7	Tulsi	Prevent bacterial and fungal infections	
8	Guava leaves	Antidandruff agent	
9	Neem	Antidandruff and antiseptic properties	

10	Amla	Prevents impulsive greying	
11	Liquorice	Soothes the scalp	
12	Camphor	Promote hair growth	

METHOD OF PREPARATION OF POLYHERBAL HAIR OIL



Fig13: Hair oil

By using the direct boiling process, two distinct formulations (F1 & F2) of polyherbal oil were prepared with varying concentrations (2.5% & 7.5%, respectively). For this, all plant item that

was gathered was thoroughly cleaned, dried, and ground into a fine powder. Precisely weighed ingredients were added to the beaker, including tulsi powder, hibiscus powder, neem powder, dry amla powder, liquorice powder, bhringraj powder, curry leaves powder, and dry guava leaf powder. After carefully weighing, grinding, and sieving, camphor was added to the beaker. Afterward required amount of sesame oil and castor oil were mixed together (Table 2) & added to beaker. The mixture was then boiled for 15 to 20 minutes. The solution was filtered through muslin fabric after it had boiled. Lemongrass was utilised as a scent. After that, the prepared oil was carefully kept in an amber-colored container.^{28,29}

Table 3: Uses of herbal ingredients

Sr. No	Ingredients	F1 (2.5%)	F2 (7.5%)
1	Castor oil	2.5 ml	7.5 ml
2	Sesame oil	2.5 ml	7.5 ml
3	Hibiscus	2.5 gm	7.5 gm
4	Curry leaves	2.5 gm	7.5 gm
5	Bhringraj	2.5 gm	7.5 gm
6	Lemon grass	2.5 gm	7.5 gm
7	Tulsi leaves	2.5 gm	7.5 gm

8	Guava leaves	2.5 gm	7.5gm
9	Neem	2.5 gm	7.5 gm
10	Amla	2.5 gm	7.5 gm
11	Liquorice	2.5 gm	7.5 gm
12	Camphor	2.5 gm	7.5 gm



Figure 14 : Polyherbal hair oil (F1 & F2)

EVALUATION OF POLYHERBAL HAIR OIL

General characterization

General characteristics like colour and odour of formulation & physical characteristics including specific gravity, pH, viscosity, refractive index, acid value, and saponification value were determined. 8,14,29, 30, 31

Specific gravity

Specific gravity bottle was taken, rinsed with distilled water, dried in the oven for 15 minutes, cooled & closed with a cap. Afterwards gravity bottle was weighed (a). Now, the herbal hair oil was put into the same specific gravity bottle, sealed with a top, and weighed once again (b). The sample's weight in millilitres was calculated by deducting the weight (b-a).

pH

Using a pH metre, the pH of the polyherbal hair oil was ascertained. The most frequent and accurate way to measure pH is with a probe and metre, or pH metre, which is a type of scientific equipment. A little voltage is applied to a glass electrode that makes up the probe. The voltmeter measures the glass electrode's electrical impedance and shows pH values rather than volts. pH meter was calibrated before using with standard liquid

solution of known pH. The probe was dipped into the hair oil & pH was recorded in the pH metre.

Organoleptic evaluation

colour, odor, skin irritation are determined manually.

Sensitivity test

After applying the prepared herbal hair oil on 1 centimetre area of hand's skin, it was left in the sun for four to five minutes.

Primary skin irritation test

The prepared formulation was evaluated for the principal test of cutaneous irritation on forearm, little amount of formulation was applied on the test site. The test site was observed for edema and erythema for 3 to 4 hrs.

Saponification value

After precisely weighing 2g of oil, it was added to a 250 ml iodine flask. The flask was then filled with 25 millilitres of 0.5 M alcoholic potassium hydroxide & the mixture was refluxed for 30 minutes in a water bath. After refluxing freshly prepared 0.1 molar KOH solution was added and the mixture was titrated against 0.5 M HCl solution with an indicator phenolphthalein.

Acid value

0.1 M solution of KOH was prepared by dissolving 0.56 g of KOH pellets in 100 ml of distilled water. This solution was then filled in burette. Following that 25 ml of ethanol and 25 ml of ether were poured to 10 ml of oil & it was titrated against 0.1 molar potassium hydroxide solution using phenolphthalein as an indicator.

Acid value: 5.61n/w

Where,

n: Number of ml of 0.1M KOH W: Weight of oil

Viscosity

It is an index of resistance of a liquid to flow, the higher the viscosity of a liquid, the greater is the obstruction to the flow. Ostwald's viscometer was used to measure the viscosity.

Phytochemical screening

Test for flavonoids:

Lead acetate Test: Few drops of a 10% lead acetate solution were added to 10 ml of drug extract.

Test for triterpenoids and steroids

Salkowski's Test: The test solution was mixed by adding a couple drops of conc. sulfuric acid, and it was left to stand for a while.

Test for phenols

Ferric chloride test: To the test extracts, 5% ferric chloride solution was added.

RESULTS AND DISCUSSION

A highly popular hair treatment is herbal hair oil. In addition to encouraging natural hair development, it offers a variety of vital nutrients needed to keep sebaceous glands functioning normally. Several characteristics of two concentrations of poly herbal hair oils were assessed, including odour, colour, pH, specific gravity (density), viscosity, acid value, refractive index, saponification value, and irritant test. An appropriate organoleptic character was demonstrated by the hair oils made from a blend of herbs. Combinations of amla, hibiscus, camphor, and bhringraj are known to prevent

premature greying, while tulsi, bhringraj, guava, and curry leaves are said to offer anti-dandruff properties. In addition to moisturising hair, castor oil offers anti-inflammatory qualities. This study focuses primarily on the role that herbal hair oil plays in treating hair problems like dandruff and grey hair. The organoleptic properties, pH, saponification value, primary skin irritation test, sensitivity test, and refractive index of synthesised hair oil were appraised. Each and every criterion was found to be acceptable and adequate. The results of the evaluation of polyherbal hair oils are summarised in Tables 4 and 5.



Fig 15: Phytochemical Screening



Fig 16: pH measurement

Table 4: Evaluation of Herbal hair oil

Sr. No.	Parameters	Observations	
		(F1)	(F2)
1	Colour	Dark brown	Dark brown
2	Oduor	Characteristic	Characteristic
3	Specific gravity	1.093	1.102
4	Viscosity	0.857 Poise	0.889 Poise
5	pH	5.75	5.94
6	Acid value	6.502	7.098
7	Saponification value	89.05	94.63
8	Irritation test	No irritation	No irritation
9	Sensitivity test	No irritation	No irritation
10	Refractive index	1.37	1.56

Table 5: Phytochemical screening of formulations

Sr. No.	Test	Result (F1)	Result (F2)
1.	Flavonoid's	+	+
2.	Steroids & Triterpenoids	+	+
3.	Phenols	+	+

+ ve = present, -ve = absent

CONCLUSION

The most well-known hair care product is herbal hair oil. It provides multiple essential nutrients which is necessary to keep the sebaceous glands active and encourage the growth of hair. In the present study, a variety of herbs are used to make herbal hair oil. This herbal oil can effectively prevent pre-mature greying and treat dandruff problems as the ingredients used for preparing polyherbal hair oil were reported to have hair growth, anti-dandruff, moisturizing & antigreying properties. Overall, the combination of vitamins, antioxidants, terpenoids, and essential oils in this herbal preparation is good. Every single value in the assessment of finished product showed that they are within the acceptable limits. Thus, it may be inferred that the oil is advantageous for preserving healthy hair development & in preventing dandruff & graying of hair. Although further detailed clinical studies assessing hair parameters before and after treatment are need to be done to confirm its anti-greying & anti-dandruff potential.

REFERENCES

- Jadhav VM, Thorat RM, Kadam VJ, Gholve SB. Kesharaja: hair vitalizing herbs. *International journal of Pharmtech research*. 2009;1(3):454-67.
- Satheeshan, K. N., Seema, B. R., & Manjusha, A. M. (2020). Development and evaluation of VCO based herbal hair tonic. *Journal of Pharmacognosy and Phytochemistry*, 9(3), 485-493.
- Sabarwal N, Sudhakar CK, Barik R, Jain S, Varkey D. *Ethnopharmacology and hair: Indian perspectives*. In *Handbook of hair in health and disease* 2011 Nov 15 (pp. 138-156). Wageningen Academic.
- Shah RR, Mohite SA, Patel NR. Preparation and evaluation of polyherbal hair oil-an effective cosmetic. *Asian Journal of Pharmaceutical Research*. 2018;8(1):36-8.
- Dahanukar SA, Kulkarni RA, Rege NN. Pharmacology of medicinal plants and natural products. *Indian journal of pharmacology*. 2000 Jul 1;32(4):81-118.
- Rathi V, Rathi J, Tamizharasi S, Pathak A. Plants used for hair growth promotion: A review. *Pharmacognosy Reviews*. 2008;2(3):185.
- Schoff WH. Camphor. *Journal of the American Oriental Society*. 1922 Jan 1;42:355-70.
- Adhirajan N, Kumar TR, Shanmugasundaram N, Babu M. In vivo and in vitro evaluation of hair growth potential of *Hibiscus rosasinensis* Linn. *Journal of ethnopharmacology*. 2003 Oct 1;88(2-3):235-9.
- Agrawal A, Pal VK, Sharma S, Gupta A, Irchhiaya R. Phytochemical investigation and hair growth promoting activity of *Hibiscus rosasinensis* leaf extract. *Journal of Chronotherapy and Drug Delivery*. 2016;7(1):31-9.
- Mathur S, Kachhwaha S. Neem tree: amazing beauty component in skin and hair care. *Advances in Pharmacology and Toxicology*. 2015 Dec 1;16(3):31.
- SK T, KV AK. Formulation and evaluation of anti-dandruff herbal shampoo containing *Datura metel* [linn] loaded solid lipid nanoparticles.
- Niharika A, Aquicio JM, Anand A. Antifungal properties of neem (*Azadirachta indica*) leaves extract to treat hair dandruff. *E-ISRJ*. 2010 Jul;2:244-52.

13. Cohen MM. Tulsi-*Ocimum sanctum*: A herb for all reasons. *Journal of Ayurveda and integrative medicine*. 2014 Oct;5(4):251.
14. Aburjai T, Natsheh FM. Plants used in cosmetics. *Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives*. 2003 Nov;17(9):987-1000.
15. Mysore V, Arghya A. Hair oils: Indigenous knowledge revisited. *International journal of trichology*. 2022 May 1;14(3):84-90.
16. Fong P, Tong HH, Ng KH, Lao CK, Chong CI, Chao CM. In silico prediction of prostaglandin D2 synthase inhibitors from herbal constituents for the treatment of hair loss. *Journal of ethnopharmacology*. 2015 Dec 4;175:470-80.
17. Gupta A, Malviya R, Singh TP, Sharma PK. Indian medicinal plants used in hair care cosmetics: a short review. Pharm Lin TK, Zhong L, Santiago JL. Anti-inflammatory and skin barrier repair effects of topical application of some plant oils. *International journal of molecular sciences*. 2017 Dec 27;19(1):70. *acognosy Journal*. 2010 Jun 1;2(10):361-4.
18. Lin, T. K., Zhong, L., & Santiago, J. L. (2017). Anti-inflammatory and skin barrier repair effects of topical application of some plant oils. *International journal of molecular sciences*, 19(1), 70.
19. Hernandez EM. Specialty oils: functional and nutraceutical properties. *Functional dietary lipids*. 2016 Jan 1:69-101.
20. Shahidi F, editor. *Bailey's Industrial Oil and Fat Products, Industrial and Nonedible Products from Oils and Fats*. John Wiley & Sons; 2005 Apr 8.
21. Srivastav A, Dandekar P, Jain R. Penetration study of oils and its formulations into the human hair using confocal microscopy. *Journal of cosmetic dermatology*. 2019 Dec;18(6):1947-54.
22. Flores G, Wu SB, Negrin A, Kennelly EJ. Chemical composition and antioxidant activity of seven cultivars of guava (*Psidium guajava*) fruits. *Food chemistry*. 2015 Mar 1;170:327-35.
23. Beatriz PM, Ezequiel VV, Azucena OC, Pilar CR. Antifungal activity of *Psidium guajava* organic extracts against dermatophytic fungi. *Journal of Medicinal Plants Research*. 2012 Oct 25;6(41):5435-8.
24. Agrawal A, Jain SD, Prajapati H, Gupta AK. Formulation and Evaluation of Hair Oil Containing Herbal Ingredients. *Journal of Drug Delivery & Therapeutics*. 2020 Jan 15;10.
25. Ganjewala DE, Gupta AK. Lemongrass (*Cymbopogon flexuosus* Steud.) Wats essential oil: overview and biological activities. *Recent Progress in Medicinal Plants*. 2013 Sep;37:235-71.
26. Narule OV, Kengar MD, Mulik PP, Nadaf SI, Mote BA, Dudhagaonkar TD. Formulation and Evaluation of Poly Herbal Hair Oil. *Research Journal of Topical and Cosmetic Sciences*. 2019;10(1):9-12.
27. Banerjee PS, Sharma M, Nema RK. Preparation, evaluation and hair growth stimulating activity of herbal hair oil. *J Chem Pharm Res*. 2009;1(1):261-7.
28. Gautam SA, Dwivedi SU, Dubey K, Joshi H. Formulation and evaluation of herbal hair oil. *Int J Chem Sci*. 2012;10(1):349-53

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