ORIGINAL ARTICLE

Development and Characterization of Polyherbal Hair Oil for Prevention of Hair Fall

Shraddha Pawar[1], Priya Patil[1], Pravin G. Dhone[2], Neeta Rai[1], Dipali M. Dhoke[3], Poonam R. Inamdar[1], Amrita Thakur[1]

[1]Department of Pharmacy, School of Pharmacy, Vishwakarma University, Pune, Maharashtra, India, [2]Department of Pharmacology and Convenor Drugs and Therapeutics Committee, DMMC DMIHER (Deemed University), Nagpur, Maharashtra, India, [3]Department of Pharmaceutics, JSPM Charak College of Pharmacy and Research, Wagholi, Pune, Maharashtra, India

Abstract

Herbs are an essential component of the health-care system in Ayurvedic medicine. In addition to being used in medicine, herbs are also used to make a variety of cosmetics and colors, as well as to enhance physical beauty. The purpose of the present study is to prepare herbal hair oil from the fresh leaves of different plants. Making herbal hair oil with fresh curry leaves, hibiscus flowers, and fenugreek seeds is the goal of the present study. According to the Ayurvedic pharmacopeia, the oil was manufactured. Different formulations were made, and the best formulation, f2, produced superior results as the pH ranged between 6 and 4.7, whereas f4's saponification value was discovered to be 245.43 and f2's acid value was 4.7. The prepared herbal hair oil was assessed using a number of criteria, including organoleptic qualities, pH, viscosity, acid value, and saponification value. On our forearm, we evaluate the prepared compositions for primary skin irritation. The aforementioned criteria were found to be satisfactory and within acceptable limits. Of the three concentrations of herbal hair oil created, the third concentration produced superior outcomes to the other two. All the values in the evaluation of the finished product showed that they were within acceptable limits. Hence, it is concluded that the oil is beneficial in maintaining good hair growth, turning grey hairs black, providing protection from dandruff, and resulting in lustrous-looking hair.

Key words: Hair, hair oil, herbal formulations, stability studies

INTRODUCTION

Hair is one of the pieces of evidence found at the crime scene. It can be determined from the hair whether the source is human or animal. Hair oil is an oil-based cosmetic to improve the condition of the hair. Hair oil products may contain different types of oils.[1-3] The figure of structure of hair as shown in Figure 1.

These are often claimed to help regrow, dry or damaged hair. In human hair, there are two categories (Epidermis is the outside layer of the skin; "epi" means upper or outer; "derm" means skin):

- Roots (hair roots) – beneath the skin[4,5]
- Above the epidermis, the hair shaft[4,5]

Anti-dandruff hair oil

Anti-dandruff hair oil, rich in natural oils, prevents dandruff by eliminating microbial contamination on the scalp. The formula has selected plant species using Ayurvedic hair oil to treat head and scalp problems. In the process from raw materials to final products (quality control), herbs are proven to contain ingredients that promote hair growth and eliminate dandruff.[6-8]

Application of hair oils

Nourishes the hair

Herbal oil gives shine and smoothness to the hair and removes electrification. It is important not to take a hot shower while eating the hair because it makes the hair dry

Address for correspondence:
Dr. Neeta Rai, School of Pharmacy, Vishwakarma University, Pune, Maharashtra, India.
E-mail: neeta.rai@vupune.ac.in

Received: 24-07-2023
Revised: 08-09-2023
Accepted: 17-09-2023

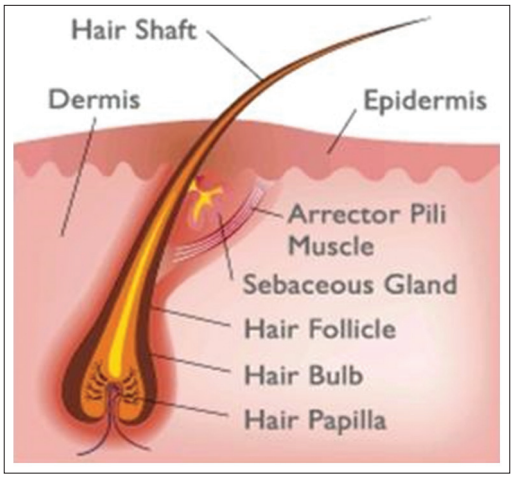

Figure 1: Structure of hair

and brittle and therefore wreaks havoc and causes the hair to fall out.[9,10]

Improves elasticity

Herbal oil prevents brittle hair. It supports elasticity, thus strengthening the hair shaft and enhanced nutrition. We are what we eat. Use a wide blade.[11,12]

Promotes hair growth

Herbal oil promotes hair growth and prevents hair loss. Vitamin C can reduce hair loss. Vitamins support iron absorption.[13,14]

Protect and repair hair

Herbal oil, thanks to its excellent nourishing properties, protects hair from damage caused by makeup, contains essential nutrients, and helps to support damaged hair.

Avoid some hair. It is added slowly when is years old.[15,16]

Prevents heat styling damage

Herbal oil forms a protective layer around hair strands, protecting them from damage by styling tools and chemicals. Heat exposure changes the shape of the hair keratin bundles, eventually causing the hair to weaken, lose elasticity, and become damaged.[17,18]

Prevents scalp infections

Herbal oil contains antibacterial and antifungal properties. This product shows that it can improve scalp health and prevent fungal diseases such as dandruff. Wash your skin regularly, at least 2–3 times a week.[17]

Benefits of hair oil[19,20]

1. Promotes hair growth
2. Helps prevent damage caused by heat and styling
3. Increases shine
4. Reduces dandruff and hair dryness
5. Prevents excessive oiliness of the scalp
6. Banned chemical
7. Hydrated – prevents hair loss.
8. Relieves depression.

Disadvantage of hair oils[21]

1. Using too much oil can weigh down the hair and damage the scalp
2. People can make oil that can damage the scalp, which can damage the scalp. If you have a sensitive scalp, do not use herbal hair oil when you are in good strength as this will only cause scalp issues and if your hair is oily or oily, it will cause excessive oiliness.
3. Hair oil can cause seborrheic dermatitis or dandruff.

Limitations of hair oil[22]

1. Oil can collect airborne pollutants and dust.[27]
2. Too much oil can make hair feel greasy[28,29]
3. Heavy oil can make hair heavy[30]
4. Massaging your hair with oil can increase blood circulation and relax your body[31]
5. Oiling your scalp can prevent dandruff and scalp[32]
6. Oiling your hair and prevents it from becoming brittle and dull[33]
7. Hot oil treatment locks in more moisture and adds shine, volume, and elasticity[34]
8. Oils such as coconut oil and castor oil promote hair growth[35]
9. Oils and moisturize the scalp[36]
10. Hibiscus herbal oil increases circulation follicles stronger and regenerating scalp.[37]

MATERIALS AND METHODS

Materials

The curry leaves and hibiscus were collected from the medicinal garden Vishwakarma University Pune and coconut oil and methi seed were purchased from the local market in Pune. The formulation table is given in the Table 1. All the organoleptic properties was identified of given materials and given in Table 2-5.

Methods

1. Weigh accurately methi seeds (28–32 mg), curry leaves (33–37 mg), Hibiscus flower (2–3), and coconut oil (75–100 ml)
2. Take curry leaves and wash it properly.
3. Take the hibiscus flower and wash it properly.
4. Take a clean beaker, and add 75 ml of coconut oil.

Table 1: Ingredients quantity

S. No.	Ingredients	F1	F2	F3	F4	F5
1.	Curry leaves	37	36	35	34	33
2.	Methi	28	29	30	31	32
3.	Hibiscus flower oil	10	10	10	10	10
4.	Coconut oil	100	100	100	100	100

Table 2: Identification of methi seeds

Identification of methi seeds	Description
Methi	Seeds
Color	Pale brown to golden yellow
Taste	Bitter in taste
Shape	Rectangular to oval in shape with deep grooves between the radical and cotyledon

Table 3: Identification of curry leaves

Identification of curry leaves	Description
Curry leaves (plant)	Leaves
Color	Dark green to green color
Taste	Bitter to taste like asafetida
Shape	Oval in shape narrow in a point

Table 4: Identification of hibiscus flower

Identification of hibiscus flower	Description
Hibiscus	Flower
Color	Red, pink, yellow, orange, and multicolor
Taste	Tart almost cranberry-like flavor
Shape	Trumpet-shaped

5. Add 25 ml of distilled water.
6. All ingredients are added in the beaker and evaporate the water.
7. Heating on water bath with continuous for 30 min.
8. Take out the beaker from the water bath cool it and filter the oil.
9. Makeup until 100 ml of coconut oil.
10. This hair oil is packed and submitted.

Evaluation parameters

Physical evaluation[21,22]

1) Viscosity: Viscosity was determined using Ostwald's viscometer. The result was obtained and shown in Table 6.

Procedure

a) Thoroughly clean the viscometer.
b) Mount the viscometer in the vertical position on a suitable stand.
c) Fill dry viscometer up to mark.
d) Count the time required in seconds for the hair oil sample to flow from mark A to B.
e) Repeat three times.
f) Determine the densities of the liquids.[38]

Table 5: Identification of coconut oil

Identification of coconut oil	Description
Coconut fruit	Oil
Color	Colorless
Texture	Sticky
Shape	Semi-solid

Density (Specific gravity)[21,22]

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. The result was given in Table 6.[39,40]

1) Color
2) Odor.

Chemical evaluation[23,24]

1) Acid value: −10 ml of oil was added with 25 ml of ethanol and 25 ml of ether. Phenolphthalein was added as indicator and titrated with 0.1 m potassium hydroxide solution,[41,42]

Acid value = 5.61*n/w

Where,
N=Number of ml 0.1 M KOH
W=Weight of oil

Procedure

i. Weigh accurately 9.47 g of oil sample; add it to a mixture of 25 ml of ethanol and 25 ml of ether. If acid does not dissolve in a solvent mixture.
ii. Titrate solution of acid against 0.1 M potassium hydroxide and phenolphthalein as the indicator.
iii. Carry out blank titration by omitting the substance.
iv. Take readings and calculate acid value using formula.

Acid value = 5.61*n/w

Where, *n*=No. of ml of 0.1 M KOH required.
W=Weight of oil

Saponification value[25]

2 g oil was accurately weighed and transferred into a 250 ml of iodine flask. Take a 25 ml of 0.5M alcoholic potassium hydroxide was added and boiled under reflux on the water bath for 30 mins. Phenolphthalein was added as indicator and titrated against 0.5 M HCL ("a" ml) similarly blank was performed ("b" ml) without the sample. The result was given in Table 6.[43,44]

Table 6: Pre-identification test

S. No.	Parameters	Obtained values				
		F1	F2	F3	F4	F5
1.	Color	Brownish	brownish	Brownish	Brownish	brownish
2.	Weight of 100 ml	71.2	71.5	71	71.8	71
3.	Specific gravity	1.1156	1.116	1.118	1.1156	1.1176
4.	Ph	6	6	6	6	6
5.	Acid value	3.2	4.7	3.8	4.1	3.8
6.	Saponification value	238.425	266.475	245.4375	231.4125	231.4125
7.	Viscosity	0.6042	0.6101	0.6098	0.6070	0.6341
8.	Odor	Characteristic	Characteristic	Characteristic	characteristic	characteristic

Table 7: Primary skin irritation test

S. No.	Test	Result
1.	Skin irritation test	No irritation
2.	Sensitivity test	No irritation

Procedure

a) Weigh accurately 2 g oil accurately and transfer into a 250 ml of iodine flask.
b) Take a 25 ml of 0.5 M alcoholic potassium hydroxide was added and boiled under reflux ("a" ml). Similarly blank was performed ("b"ml) without sample.
c) Carry out blank titration omitting substance.
d) Take reading and calculate saponification value.

Saponification value= 28.05(b-a) *w

Where,
a=ml of KOH required to neutralize the substance
b=ml of KOH required for blank
W= weight of substance in g.

Biological evaluation[26]

1. Primary skin irritation test[45]
2. Sensitivity test.[45]

The result was given in Table 7.

Pre-identification test

The Pre-identification test was performed for given formulation and result was analysed. The result was shown in given Table 6.

RESULTS

Herbal hair oil was brown in appearance. Herbal hair oil had an appropriate pH, saponification value, acid value, and specific gravity, after the application, of herbal hair oil there was good hair growth and volume with no side effect and no irritation. The formulation was stable for 60 days.

Primary skin irritation test

The test verify the presence of dermal reactions from the test substances on the skin on test human /animal species.The result was shown in Table 7.

CONCLUSION

Herbal oil is one of the most well-known hair treatments. Herbal oil not only moisturizes the scalp, it also reverses dry scalp and dry hair. It provides many important nutrients needed to maintain the activity of the sebaceous glands that promote hair growth.

Using different herbal products with different effects in the right combination will be beneficial for the hair.

All restrictions are not exceeded and as all the additional ingredients have many benefits, this oil helps in maintaining good hair, turning gray hair into black, preventing dandruff, reducing stress, etc., it will help. And create shiny hair.

This oil is not only used for moisturizing purposes but also promotes hair growth, improves blood circulation to the scalp, prevents dandruff, and adds volume to the hair shaft. The formula meets the requirements of acid value, saponification value, viscosity, density, and opacity index.

Curry leaves, meth seeds, hibiscus flowers, coconut oil, etc., many herbal ingredients may have important functions in hair growth.

Herbal oil hair is evaluated in many parameters such as sensitivity test, viscosity, pH, irritation test, roughness test, saponification rate, and acidity.

Herbal hair oil is made from various plants and its importance in formulation is explained. Therefore, from the available research, it has been found that the best-formulated hair oil and additional analytical and chemical samples confirm the effectiveness of the formulated herbal hair oil.

REFERENCES

1. Headington JT. Telogen effluvium. New concepts and review. Arch Dermatol 1993;129:356-652.
2. Kligman AM. Pathologic dynamics of human hair loss. I. Telogen effluvium. Arch Dermatol 1961;83:175-98.
3. Paus R, Cotsarelis G. The biology of hair follicles. N Engl J Med 1999;341:491-7.
4. Tiwari G, Tiwari R. Assessment of nutraceutical potential of herbs for promoting hair growth: Formulation considerations of herbal hair oil. Open Dermatol J 2021;15:78-83.
5. Kuber BR, Lavanya C, Haritha CN, Preethi S, Rosa G. Preparation and evaluation of poly herbal hair oil. J Drug Deliv Therapeut 2019;9:68-73.
6. Banerjee PS, Sharma M, Nema RK. Readiness, assessment and hair development animating action of natural hair oil. Diary Compound Drug Explor 2009;1:261-7.
7. Mithal BM, Shah RN. A Hand Book of Beautifying Agents first Release. Delhi: Vallabh Prakashan; 2000. p. 141-2.
8. Sawarkar S, Deshmukh V, Jayaganesh S, Perumal O. Clinical evaluation of cactus (*Cereus grandiflorus*) enriched hair oil for hair fall disorders. Madridge J Dermatol Res 2018;3:61-4.
9. Bhatia SC. Perfumes, Soaps, Detergents and Cosmetics. New Delhi: CBS publishers and Distributions; 2001. p. 639.
10. Wagner H, Bladt S, Zgainski FM. Plant Drug Analysis. Verlas, Berlin: Springer; 1996. p. 194.
11. Shah CS, Qudry JS. A Text Book of Pharmacognosy. Ahmedabad: B.S. Shah Prakashan; 1996.
12. Kumar PS, Sucheta S, Uma Maheswari A. *In vitro* and *In vivo* evaluation of anti-activity of formulated polyh. J Pharm Res 2010;3.
13. Potluri A, Harish G, Kumar B, Durraivel S.. Formulation and evaluation of herbal anti-dandruff dandruff shampoo. Indian J Res Pharma Biotechnol 2013;1:835-9.
14. Gaikwad PD, Mulay KV, Borade MD. Formulation and evaluation of herbal shampoo. Int J Sci Res 2020;9:29-31.
15. Malpani T, Jeithliya M, Pal N, Puri P. Formulation and evaluation of pomegranate based herbal shampoo. J Pharmacogn Phytochem 2020;9:1439-44.
16. Pundkar AS, Ingale SP. Formulation and evaluation of herbal liquid shampoo. World J Pharm Res 2020;9:901-11.
17. Bhavsar RS, Sagrule SD, Unhale SS. Formulation and development of sulphate free shampoo. Int J Res Appl Sci Eng Tech 2022;8:18.
18. Vijayalakshmi A. Sangeetha S., Ranjith N. Formulation and evaluation of herbal shampoo. Asian J Pharm Clin Res 2018;11:121-4.
19. Reddy VS, Reddy DJ, Velu MG. Formulation and evaluation of antidandruff Shampoo. J Pharm 2016;10:700-2.
20. Revansiddappa M, Sharadha R, Abbulu K. Formulation and evaluation of dandruff shampoo. J Pharmacogn Phytochem 2018;7:64-67.
21. Singh A, Saxena A. Formulation and evaluation of JETIR21065 67 herbal anti-dandruff shampoo from Bhringraj. J Emerg Technol Innov Res 2020:1:1:5-11.
22. Nageswar Rao V, Shankar T, Dixit SK, Ray AB. Preparation and utilization of Ksheer Bala Taila. Indian J Trad Knowl 1996;17:21-5.
23. Kumar A, Kumar A, Baxi AJ. Standardization of ayurvedic medicated oil and the effect of moorchhan on the amount of marker in the oil. Indian Drugs 2007;44:35-41.
24. Saraf S. Herbal hair oil cosmetics: Advancements and recent findings. World J Pharm Res 2014;3:3278-94.
25. Gautam S, Dwivedi SU, Dubey KU, Joshi HE. Formulation and evaluation of herbal hair oil. Int J Chem Sci 2012;10:349-53.
26. Mithal B, Shah R. A Hand Book of Cosmetics. 1st ed. New Delhi: Vallabh Prakashan; 2000. p. 141-2.
27. Evans W. Pharmacognosy. 15th ed. Edinburgh: Saunders Publishers Ltd.; 2002. p. 292.
28. Rushton DH, Norris MJ, Dover R, Busuttil N. Causes of hair loss and the developments in hair rejuvenation. Int J Cosmet Sci 2002;24:17-23.
29. Banerjee PS, Sharma M, Nema RK. Preparation, evaluation and hair growth stimulating activity of herbal hair oil. J Chem Pharm Res 2009;1:261-7.
30. Bureau of Indian standards, BIS Specification, 7123; 1993.
31. Franbourg A, Hallegot P, Baltenneck F, Toutain C, Leroy F. Current research on ethnic hair. J Am Acad Dermatol 2003;48 6 Suppl: S115-9.
32. Wolfram LJ. Human hair: A unique physicochemical composite. J Am Acad Dermatol 2003;48 6 Suppl 1:S106-4.
33. Swift JA. Human hair cuticle: Biologically conspired to the owner's advantage. J Cosmet Sci 1999;50:23-47.
34. Feughelman M. Mechanical Properties and Structure of Alpha-Keratin Fibers. Sidney: UNSW Press; 1997.
35. Rathi V, Rathi JC, Tamizharasi S, Pathak AK. Plants utilized for hair development advancement: A review. Phcog Fire Up 2008;2:165-7.
36. Dixit VK, Adhirajan N, Gowri C. Improvement and assessment of home-grown definitions for hair growth. Indian Med 2001;38:559-63.
37. Harrison JL, Davis KD. Cold-evoked pain varies with skin type and cooling rate: A psychophysical study in humans. Pain 1999;83:123-35.
38. Randall VA, Botchkareva NV. The biology of hair growth. In: Cosmetics Applications of Laser and Light-Based

Systems. Norwich: William Andrew; 2009:35.
39. Kelly RC, Mieczkowski T, Sweeney SA, Bourland JA. Hair analysis for drugs of abuse. Hair color and race differentials or systematic differences in drug preferences? Forensic Sci Int 2000;107:63-86.
40. Banerjee PS, Sharma M, Nema RK. Preparation, evaluation and hair growth stimulating activity of herbal hair oil. J Chem Pharm Res 2009;1:261-7.
41. Gautam S, Dwivedi SU, Dubey KU, Joshi HE. Formulation and evaluation of herbal hair oil. Int J Chem Sci 2012;10:349-53.
42. Regupathi T, Chitra K, Ruckmani K, Lalitha KG, Kumar M. Formulation and evaluation of herbal hair gel for hair growth potential. J Pharmacol Clin Res 2017;2:1-8.
43. Kolhe S, Indore P, Shewale S, Pol A, Hanmante L. Formulation and evaluation of polyherbal hair oil for alopecia. J Drug Deliv Therapeut 2019;9:387-90.
44. Pal RS, Pal Y, Raj AK, Wal P, Wal A. Synthesis and evaluation of herbal based hair dye. Open Dermatol J 2018;12:90-8.
45. Tiwari M, Dubey V, Lahiri A. Comparative study of various herbal cosmetics: A survey. Asian J Pharm Clin Res 2020;13:31-4.

Source of Support: Nil. **Conflicts of Interest:** None declared.