WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 13, Issue 13, 1296-1305. Research Article ISSN 2277–7105

FORMULATION AND STANDARDISATION OF HERBAL HAIR OIL FOR ANDROGENIC ALOPECIA

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Article Received on
19 May 2024,

Revised on 09 June 2024,
Accepted on 30 June 2024

DOI: 10.20959/wjpr202413-33062

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ABSTRACT

Alopecia, a condition present since the beginning of mankind has impacted individuals of all ethnicities and genders to different extents. In allopathy, the treatment for hair-related issues is costly and inaccessible for those with limited financial means. Herbal hair preparations are free from various side effects that of chemically synthesized. Therefore, instead of using various formulations for different hair problems, there is a necessity to formulate one single preparation which overcomes maximum hair problems. The present study involves preparation of herbal hair oil using the herbal ingredients like Aloevera, Fenugreek, Onion, Rosemary, Nettleroot, *Indigoferratinctoria* and Coconut oil. A mixture of crude drugs was prepared in the form of herbal hair oil by boiling method. We have used seven formulas using different herbal drugs and all the formulation are showing anti-hair fall 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 of the hair. The formulated herbal oil is subjected to evaluation based on several parameters such as organoleptic properties, specific gravity, viscosity, acid value, saponification value, Iodine value and pH. The results obtained were comparable to standard values with no sedimentary or gritty texture and showing satisfactory organoleptic properties. The incorporation of the bioactive ingredients into herbal hair oil has a beneficial impact on physical attributes and provides essential nutrients that contribute to the maintenance of healthy and attractive hair.

KEYWORDS: Herbal hair oil, androgenic alopecia, Aloevera, fenugreek, coconut oil.

1. INTRODUCTION

The basic idea of skin care lies deep in the Rigveda, Yajurveda, Ayurveda, Unani and Homeopathic system of medicine. In this modern era the knowledge and experience of usage of herbs are being blend with advanced cosmetic technology to develop a safe and effective product which has wider range of people acceptability. Herbal cosmetics are prepared by the combination of bioactive ingredients and pharmaceutical products. The presence of phytochemicals and botanicals in the herbal products have dual significance, one that they are used as cosmetics for body care and another that phytochemicals improve the biological functions of human body naturally results in healthy skin and hairs. The current trend moves toward the herbalism and the use of natural products. Indian herbs are the richest source to be used in cosmetic industries**.** Herbs are added in cosmetics as they are safer for our skin. Herbal hair oils were serving the purpose of hair treatment. Herbal hair oil not only moisturizes scalp but also reverses dry scalp and dry hair conditions to increase hair growth. It provides numerous essential nutrients required to maintain normal functions of the sebaceous gland and promote natural hair growth. Several scientific attempts have been made to prevent hair loss and increase hair growth, but nothing has offered any great promise. One of the reasons for the hair loss is due to 5- alpha reductase enzyme which converts testosterone to Dihydrotestosterone (DHT). The hair follicles have receptors of DHT and as a result the dermal papillae cells shrink due to the binding of DHT which cause atrophy of the stem cell- Dermal papillae.[9] The use of herbs that have pronounced DHT or 5-α-Reductase blocking activity can be used for the treatment of Alopecia (especially Androgenetic). There are some herbs that have proved DHT blocking activity like ***Pygeum africanum, Seneroa repens, Urtica dioica*** **(Nettle root)** and others with potential 5- α-Reductase inhibiting ability like ***Camellia sinensis, ginseng*** etc.[6] Amino-acids mainly cysteine are essential for the healthy growth of hair. Weak capillary vessels cannot furnish enough nutrition from foods and supply to hair papilla through polyherbal hair oil ingredients Hair growth Restorers can reduce the pressure on the blood vessels and also prevent the force of contraction of the vessels and expand the vessels and stimulate blood circulation.[11] Hair oils fill up any gaps between the cuticle cells which prevents the penetration of any damaging substances in the hair follicle.[1] Therefore, hair oils are the hair care formulations applied for hair disorders such as alopecia, greying of hairs, hair falling, and dryness of hairs. In this study the herbs used in the formulation has pronounced effect on the treatment of androgenic alopecia.[2]

2. MATERIALS AND METHODS

2.1 Materials

The chemicals employed in the research were purchased from the Isochem laboratories.

2.2 Methods

Preparation of ingredients: Collect the herbs and other ingredients, wash fresh herbs thoroughly to remove any dirt or impurities. Allow them to dry completely before use to prevent any moisture from being introduced into the oil, which could lead to spoilage.

Hot infusion: Heat the carrier oil and herbs together using gentle heat. Place the jar in a pot of simmering water (double boiler method) for several hours, stirring occasionally.

Adding ingredients: Add herbs and other ingredients like essential oils for fragrance or additional benefits.

Cooling and straining: It is the process of allowing infused oil to cool down to room temperature after heating with herbs, then removing any solid particles or plant material from the oil by passing it through a fine mesh strainer or cheesecloth.

Storing: Transfer the strained herbal hair oil into clean, dry glass bottles or containers. Store the oil in a cool, dark place away from direct sunlight and moisture to preserve its potency.[3]

Table 1: Formulation Table for herbal hair oil (100 ml).

S.NO	INGREDIENTS	QUANTITY
1	Aloevera	5gm
2	Fenugreek	10 gm
3	Rosemary	10 gm
4	Indigo powder	5 gm
5	Nettle root	10 gm
6	Onion	2 gm
7	Coconut oil	100 ml

2.3 PROCEDURE

1. Preparation of Ingredients

- Peel and finely chop one handful of small onions.
- Grind fenugreek seeds into a fine powder.
- Take required amount of indigo powder
- Collect dried rosemary leaves and nettle root.

2. Infusing Ingredients into Coconut Oil

- In a saucepan, combine coconut oil with chopped onion, fenugreek powder, indigo powder, rosemary leaves, nettle root and aloevera.
- Heat the mixture over low heat and let it simmer for about 30-45 minutes, stirring occasionally.
- Allow the mixture to cool down to room temperature.

3. Strain the Oil

- Once the infused oil has cooled, strain it using a fine mesh strainer or cheesecloth into a clean container or bowl.
- Squeeze out as much oil as possible from the herbal remnants.[12]

2.4 Evaluation of Herbal Hair Oil

1. Organoleptic properties: Colour, odour, physical state, sedimentation and polarity was determined manually.[4]

2. pH: The pH of herbal hair oil was determined using pH meter.[14]

3. Viscosity: The viscosity was determined using Ostwald's viscometer.

Procedure to determine the time of flow

- The cleaned viscometer is clamped vertically
- Sufficient liquid whose viscosity is to be determined is poured using pipette into bulb Y to reach the mark E.
- The liquid is then sucked or blown up to a point 1cm above mark A.
- The time for the liquid (t_1 or t_2) to fall from mark A to B is measured using a stop watch. This is repeated for three times to ensure that accurate time is only recorded.[13]

$$\text{Viscosity of liquid } (\eta 2) = \frac{\eta 1 \times \rho 2 \; t2}{\rho 1 \; t1}$$

- Η1 = Viscosity of water
- ρ_2= Density of sample
- t2= Mean time of oil from A to B
- ρ_1= Density of water
- t1= Mean time of flow of water from A to B

4. Specific gravity: Take the specific gravity bottle, rinsed it with distilled water, dry it in oven for 15 minutes, cool, closed it with cap and weigh it (a). Now fill the same specific gravity bottle with the sample and closed it with cap and again weigh it (b). Determine the weight of sample per milliliter by subtracting the weight.

Specific gravity = (b-a).[13]

5. Density: The oil density is defined as the mass per unit volume at a specified pressure and temperature.

Density = mass/volume

6. Acid value: It is the number which expresses in milligrams the amount of potassium hydroxide necessary to neutralise the free acids present in 1gm of the substance.

Acid value = 5.61n/w

Where, n is the number of ml of 0.1M potassium hydroxide required and w is the weight in gm of the substance.

Procedure to determine acid value

Dissolve about 10g of the substance under examination, in accurately weighed, 50ml of a mixture of equal volumes of ethanol (95%) and ether, previously neutralised with 0.1M potassium hydroxide to phenolphthalein solution. If the sample does not dissolve in the cold solvent, connect the flask with a reflex condenser and warm slowly with frequent shaking, until the sample dissolves. Add 1ml of phenolphthalein solution and titrate with 0.1M potassium hydroxide until the solution remains faintly pink after shaking for 30 seconds.[10]

7. Saponification value: It is the number of milligrams of potassium hydroxide necessary to neutralise the free acids and to saponify the esters present in 1gm of the substance.

Saponification value = 28.05(b-a)/w

Where, w is the weight, in gm of the substance

Procedure to determine saponification value

Introduce about 2gm of the substance under examination, accurately weighed, into a 200ml flask of borosilicate glass fitted with a reflux condenser. Add 25.0ml of 0.5M ethanolic potassium hydroxide and a little pumice powder and boil under reflux on a water bath for 30minutes. Add 1ml of phenolphthalein solution and titrate immediately with 0.5M

hydrochloric acid (a ml). Carry out a blank titration omitting the substance under examination (b ml).[10]

8. Ester value: It is defined as the number of the milligrams of potassium hydroxide required to saponify the esters present in 1gm of the substance.[10]

Ester value= Saponification value – Acid value

9. Iodine value: Iodine value is the number which expresses in grams the quantity of halogen, calculated as iodine, which is absorbed by100 gram of the substance under the described conditions

Iodine value =1.269(b-a)/w

Where, w is the weight in g of the substance

Procedure to determine the Iodine value through Iodine monochloride method or wijs method:

Place an accurately weighed quantity of the substance under examination in a dry 500 ml iodine flask, add 10 ml of carbontetrachloride and dissolve. Add 20 ml of iodine monochloride solution, insert the stopper and allow to stand in the dark at a temperature between 15 ^{0} and 25 ^{0} for 30 minutes. Place 15 ml of potassium iodide solution in the cup top, carefully remove the stopper, rinse the stopper and the sides of the flask with 100 ml of water, shake and titrate with 0.1 M sodium thiosulphate using starch solution, added towards the end of the titration, as indicator. Note the number of ml required (a). Repeat the operation without the substance under examination and note the number of ml required (b).

3. RESULTS AND DISCUSSION

The prepared herbal hair oil in greenish brown color. It has characteristic odour and smooth in appearance.

1. Organoleptic parameters

The organoleptic properties of formulated herbal hair oil was judged using color, odour, physical state, sedimentary and polarity.

Table 2: Organoleptic properties.

S.NO	PARAMETER	OBSERVATION
1	Color	Greenish brown
2	Odour	Characteristic

3	Physical state	Liquid with greesy in nature
4	Sedimentation	No sedimentation
5	Polarity	Non polar

Table 3: Evaluation parameters.

S.NO	PARAMETER	OBSERVATION
1	Ph	6.5
2	Density	0.9092 g/cm^3
3	Specific gravity	0.9125
4	Viscosity	43.32 centipose
5	Acid value	0.364
6	Saponification value	98.175
7	Ester value	98.0628
8	Iodine value	7.7

2. pH of the formulated herbal hair oil was found to be in the range 6.5-6.8 which is good for the scalp's pH.

3. Density of the formulated herbal hair oil was found to be 0.9092 g/cm^3.

4. Specific gravity of the formulated herbal hair oil was found to be 0.9125

5. Viscosity of the formulated herbal hair oil was found to be 43.32 centipose, it meets regulatory standards and doesn't contain harmful ingredients. Its moderate viscosity makes it suitable for various hair types and preferences.

6. Acid value of the formulated herbal hair oil was found to be 0.364 which indicates that the herbal hair oil is likely of high quality, stable, and suitable for cosmetic use.

7. Saponification value of the formulated herbal hair oil was found to be 98.175.

8. Ester value of the formulated herbal hair oil was found to be 98.0628. Therefore, the oils provide a balance of emolliency and spreadability, making them suitable for a wide range of hair types.

9. Iodine value of the formulated herbal hair oil was found to be7.7.It indicates good oxidative stability and safety for topical use on the hair and scalp.

The development and standardisation of herbal hair oils for the treatment of androgenic alopecia represent a multifaceted endeavor that bridges traditional herbal medicine with modern scientific principles. This discussion examines the key aspects of this process, addressing its challenges, opportunities, and implications for future research and industry practices. Traditional knowledge often guides initial choices, but contemporary research is essential to validate and quantify the efficacy of these herbs. Ingredients like alovera, fenugreek, nettle root, indigo, rosemary and onion have shown promise due to their beneficial

effects on hair growth and scalp health. However, the variability in herb potency due to factors like growing conditions and harvesting techniques poses a challenge. Future work must focus on standardising cultivation practices and ensuring consistent quality of raw materials.

5. CONCLUSION

Androgenic alopecia is frequently referred as Male pattern baldness, both men and women can be severely affected by the disorder. The main cause of androgenic alopecia is the accumulation of testosterone on the hair follicle. The development of herbal hair oils for the treatment of androgenic alopecia represents a promising alternative to conventional treatments, offering a natural approach with potentially fewer side effects. The formulation process requires meticulous selection of herbs, effective extraction methods, and rigorous standardization to ensure product efficacy and safety.[5] Herbal ingredients such as fenugreek nettle root, and rosemary, show potential in addressing the underlying causes of androgenic alopecia, particularly through DHT inhibition and promoting scalp health.[6] Future research and clinical trials are essential to validate these formulations, ensuring they meet regulatory standards and provide reliable results for consumers. This approach aligns with the growing trend towards natural and holistic personal care products, meeting the demand for safer and effective hair loss treatments. Ayurvedic herbal oil, is one of the most well recognized hair treatments. Ayurvedic herbal oil, not only moisturizes scalp but also reverses dry scalp and dry hair condition.[7] It provides various essential nutrients required to maintain normal function of sebaceous glands and promotes natural hair growth. Herbal oil provides numerous essential nutrients required to maintain normal function of sebaceous glands and promotes natural hair growth. The utilization of herbal hair oil in cosmetics enhanced many folds in personal hygiene and healthcare system.[8] Formulation was done and evaluated by means of various parameters like pH, color, odour, acid value, viscosity, specific gravity, and saponification value. Hence, there is a tremendous clamor for the herbal cosmeceutical individual care or personal health care industry, which is presently focusing and paying extra diligence on the development of herbal-based cosmetics. As nowadays, it is a fast developing segment with a mammoth scope of manifold boost in coming years. Use of bioactive ingredients in cosmetic formulations have valuable effect on body features and provide nutrients, which are essential for maintaining healthy and beautiful hairs. At last it can be concluded that, this herbal hair oil formulation has significant quality.

6. ACKNOWLEDGMENTS

Research is an endless process for acquisition of knowledge which never achieves milestones merely by an individual effort. The present investigation would not have touched objectives without blessings and guidance.

It is GOD'S GRACE, that has helped to mold this project work very effective manner and we pray that almighty may continue to bless us and guide as in future and we thank him wholeheartedly for all his blessings.

We take this opportunity with pride and immense pleasure expressing our deep sense of gratitude to our respectable and beloved guide Mrs. SHANI DOMINIC, M pharm, Associate professor of Pharmacognosy of Hindustan College of Pharmacy, Chenappady. Her wholehearted support, encouragement, innovative ideas, constant inspiration and untiring efforts has made the dissertation work and presentation a grant and glaring success.

It is most pleasant duty to thank our beloved Principal Dr. Chacko A J**,** Hindustan College of Pharmacy, Chenappady, for ensuring all the facilities that were made available to as for the smooth running of this project work.

We express our sincere thanks and respectable regards to our beloved Managing trustees**,** for all the facilities extended to us at the institution enabling accomplish our project.

Our deepest appreciation, heartfelt thanks to Dr. Shiny George, M.Pharm, Ph.D**,** and all teachers of our college for their moral support and inspiration during the work .We would like to convey our deepest thanks to the lab assistants, office staff, librarian, and others for their kind help and support.

Last but not least, we are thankful to our parents and classmates for their help in various situations enabling us to complete this work.

REFERENCE

1. G Manikanta, M. Mohan Varma, KT Sunil Kumar, MD Shaheena and K.Heelima. Formulation and Evaluation of Poly Herbal Hair Oil. International Journal of Research in Pharmacy and Chemistry, 2013; 13(1): 46-49.

2. Juhi Namdev, Rama Shukla, Sonal Gupta, Fauziya Husaini. Formulation and evaluation of poly herbal Hair oil for the treatment of Alopecia. International Journel of Pharmacy and Pharmaceutical Research, 2020; 18(1): 193-201.
3. Saraswati motamarri N, Karthikeyam M, Rajashekar S and Gopal V. Indigoferratinctorialinn; A phytopharmacology review. International Journel of Research in Pharmaceutical and Biomedical Science, 2012; 4(1): 164-169.
4. Dr.S Manohar Babu, S Lakshmisavithri, Aveda sravanthi, D Shakeena, R Selophy, M Pusphaletha. Formulation and evaluation of aloevera gel shampoo. International Journal of Pharmaceutics and Drug Analysis, 2021; 9(3): 172-179.
5. NS Yamani, Sudha, Jyotsna, K Pratyusha, and Karthika. Formulation and Evaluation of Poly Herbal Hair Oil. Journal of Pharmacognosy and Phytochemistry, 2018; 7(3): 3254.
6. Kaushik, D Gupta and amp; R Yadav. Alopecia herbal remedies. International Journel of Pharmaceutical Science and amp Research, 2011; 2(7): 1631-1637.
7. Amol A. Joshi, Pravin M. Dyawarkonda. Formulation and evaluation of polyherbal hair oil. International Journal of Green Pharmacy, 2017; 11(1).
8. Melvin Sabu, OleeviyaSojan, Prathibha C, Dr Kavitha PN and Dr Saraswathi CD. Formulation and Evaluation of Herbal Hair Oil. National Journal Of Pharmaceutical Sciences, 2021; 1(2): 94-97.
9. Aruna V, Amruthavally G V and Gayathri R Hair Root Activation by Anagen Grow- A Herbal Hair Growth Serum.Juniper online Journal of Dermatology and Cosmetics, 2019; 1(3): 56-58.
10. Indian Pharmacopoeia, Government of India, Ministry of Health & Family Welfare, published by, The Controller of publication, 2014; 2(7): 100-106.
11. Mr. Bade vikas Vinayak, Miss Kalyankar P P, Dr. Hingane L D.Formulation and evaluation of Herbal Hair oil International journel for Research in Applied Science and Engineering Technology, 2021; 9(12): 2324-2333.
12. Roy RK, Development and Evaluation of Poly Herbal Formulation For Hair Growth Promoting Activity Journal Of Cosmetic Dermatology, 2006; 6: 108-112.
13. Chaithali Chothe, Rutuja Shaha, Suraj Dakare, Comparative Study of Formulated Herbal hair Oil with Marketed Preparation, Asian Journal of Pharmaceutical Research and Development, 2018; 6(1): 1-3.
14. Mrs. Aswathy.C, Farshana Parvine, Jamsheeda.V, Shahina.K, Subeena, Preparation and Evaluation of Poly Herbal Hair Oil: An Efective Cosmetic International Journal of Pharmaceutical Research and Applications, 2022; 7(4): 264-270.