

Formulation and Evaluation of Herbal Hair Lotion

Vaishnavi P. Rajurkar, Shrejal R. Silarkar, Mr. Mohammad Vaqqas Quraishi

Nutan S. Bodhale, Divya D Raut

^{1,2} Student of B Pharmacy IVth Year, New Montfort Institute of Pharmacy, Ashti, Wardha

³ Assistant, Professor, Department of Pharmaceutics, New Montfort Institute of Pharmacy, Ashti, Wardha

^{4,5} Student of B Pharmacy IVth Year, New Montfort Institute of Pharmacy, Ashti, Wardha

Corresponding author Mail ID: vaishnavirajurkar4@gmail.com, shrejal1011@gmail.com, 4waqqas@gmail.com

Abstract: *The present study focuses on the formulation and evaluation of a natural herbal hair lotion designed to promote scalp health, reduce hair fall, enhance shine, and nourish hair from root to tip. Drawing from traditional Ayurvedic principles and modern cosmetic formulation techniques, the lotion incorporates a synergistic blend of botanical ingredients, including flaxseed, curry leaves, aloe vera, hibiscus, amla, neem, and bhringraj, which are known for their antioxidant, anti-inflammatory, and conditioning properties. The formulation process involved aqueous or ethanolic extraction, homogenization with natural oils and gelling agents, and preservation with eco-friendly stabilisers. Physicochemical parameters, including pH, viscosity, spreadability, and stability, were assessed, alongside organoleptic and antimicrobial evaluations. The resulting herbal hair lotion offers a safe, non-toxic, and effective alternative to chemical-based products, catering to the growing demand for sustainable and holistic hair care solutions.*

Keywords: Hair lotion, Hair Serum, Hair Shampoo, rosemary, bhringraj, etc

I. INTRODUCTION

The word cosmetic is derived from the Greek word cosmesis, which means "beautifying substance." With a broad range of items like lotions, powders, makeup, hair sprays, and more, cosmetics are used to improve appearance and are in high demand worldwide. The purpose of hair cosmetics is to particularly clean, nourish, and enhance the texture and appearance of various hair types, including normal, oily, and dry hair. A root and a shaft make up the intricate structure that is hair. With its connections to muscles, sebaceous glands, and follicles, the root is located beneath the skin, whereas the apparent shaft is above it. Human hair is an essential and delicate component of the body, supported by the blood supply and ongoing cell development at the hair bulb.⁽²⁾

Mammals' hair shafts are separated into four primary areas:

- Medulla
- Cortex
- Cuticle
- Hair follicle

Medulla: The hair shaft's middle layer. It can be continuous or intermittent and is not always present. It may contain melanin and is composed of big, loosely linked cells.

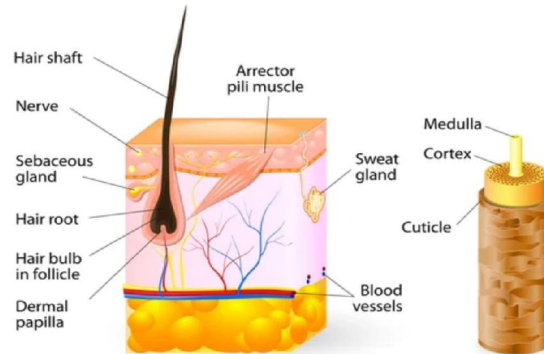
Cortex: The largest and most crucial layer of the hair shaft is called the cortex. It establishes the texture of the hair. This is where all physical and chemical changes occur. Here, melanin is discovered, and the cortex undergoes irreversible colour changes.

Cuticle: This outermost layer is composed of distinct overlapping scales. Melanin is absent from it. It protects the cortex and controls the porosity of the hairs. It has two to eleven layers.

Hair follicle: A hair follicle is a pocket of skin that extends deeply into the dermis. It is made up of the hair bulb, germinal matrix, and papilla. The waste products from the cell are returned to the capillaries through the papilla, which is situated at the base of the follicle. The germinal matrix is situated above the papilla inside the follicle⁽⁶⁾



HAIR ANATOMY



+

Hair diseases

Alopecia, or hair loss;

Bubble hair deformity.

Hair casts (loss of the inner root sheath's remaining sections)

Hirsutism (excessive hair development on normally hairless body parts).

Hair that prematurely gays.

Hair loss in patterns.

Trichotillomania, a disorder characterised by excessive hair pulling.⁽⁴⁾

Advantages include:

- No surfactant
- No animal testing
- Pure and organic ingredient
- No adverse effects
- Minimal irritation
- Lubricant,
- conditioning,
- hair development
- Preserve hair colour⁽⁸⁾

Natural Products:

As the name implies, herbal cosmetics are all-natural and devoid of any potentially dangerous synthetic chemicals. turn out to be skin-toxic. These goods, such as coconut oil and aloe vera gel, use various plant materials and extracts in place of conventional synthetic ones. Additionally, they include natural nutrients like vitamin E, which maintains skin's health, radiance, and beauty. More and more customers are worried about additives like artificial chemicals and minerals.⁽⁹⁾

Key Benefits:

- Nourishes and moisturises hair
- Reduces frizz and adds shine
- Strengthens hair and promotes growth
- Helps manageability and reduces split ends
- Protects against UV, heat, and chemical damage
- Restores damaged hair and balances scalp pH



Types of Herbal Lotions:

Hair Lotion – Stimulates follicles, often with aromatic oils

Shaving Lotion – Acts as a mild antiseptic post-shave

Face Lotion – Often used for concealing or lightening skin tone

Advantages:

- No harmful side effects
- Blends easily with skin and hair
- More effective in small amounts
- Cost-effective and widely available

Disadvantages:

- Slower results, needs long-term use
- Strong taste/odour may be hard to mask
- Complex and time-consuming to manufacture⁽¹⁷⁾

Drug profile:-

Hibiscus:-

Hibiscus rosa-sinensis L. (Family: *Malvaceae*) is an evergreen shrub native to tropical and subtropical regions, especially Asia and the Pacific Islands, widely used in **hair care formulations**. Its **flowers, leaves, roots, and stems** contain bioactive compounds beneficial for hair health. Rich in **flavonoids** and **anthocyanins**, hibiscus promotes hair growth, strengthens follicles, and prevents premature greying. **Saponins** and **tannins** act as natural cleansers and conditioners, while **mucilage** provides deep moisturization and adds shine to the hair.⁽³⁾

Role: Inhibits hair fall , Against premature greying, Hair thickening and volumising⁽³⁾



Aloe vera :-



Aloe vera (*Aloe barbadensis* Mill.), a member of the Asphodelaceae family, is widely used in hair lotion formulations for its nourishing and healing properties. The gel obtained from its thick, fleshy leaves is rich in bioactive compounds such as polysaccharides (acemannan, glucomannan), vitamins (A, C, E, B12), minerals (calcium, magnesium, zinc), and enzymes, which help moisturize the scalp, strengthen hair roots, and promote hair growth.⁽⁶⁾

Role: Strengthen and repair hair strands , Deep cleans oily hair.⁽⁶⁾

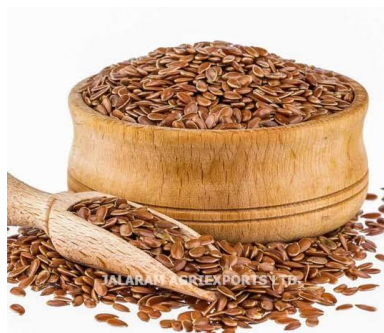
Rosemary leaves:-



Rosemary (*Rosmarinus officinalis* L., family Lamiaceae) is an aromatic, evergreen shrub whose leaves and flowering tops are used in hair lotions and cosmetic preparations. Native to the Mediterranean region and widely cultivated in Europe, Asia, and India, the needle-like, dark green leaves contain volatile oils, phenolic acids, diterpenes, flavonoids, and antioxidants. These bioactive compounds help stimulate scalp circulation, promote hair growth, reduce dandruff, strengthen hair roots, prevent hair fall and premature greying, and act as a natural conditioner. Rosemary is commonly used in hair oils, shampoos, tonics, and other cosmetic formulations to maintain healthy, strong, and shiny hair.⁽⁷⁾

Role:- Promotes Hair Growth, Strengthens Hair Roots, Reduces Hair Fall and Premature Greying.⁽⁷⁾

Flaxseed:-



Flaxseed (*Linum usitatissimum*), also known as linseed or nuts, belongs to the Linaceae family. It is rich in alpha-linolenic acid (omega-3), lignans, fibre, proteins, and phenolic compounds. These nutrients help promote hair growth, improve texture, strengthen strands, reduce breakage, and combat dryness and dandruff, making it an excellent natural ingredient for hair care.⁽⁴⁾

Role:- promotes growth, improves texture and shine,⁽⁴⁾

Coconut Oil:-

Coconut oil (Synonym: Copra Oil) is a fixed oil obtained by expression from thoroughly dried kernels of *Cocos nucifera*, belonging to the family *Palmae*. High-quality organic virgin coconut oil is cold-pressed from fresh, white coconut kernels and is 100% natural. It has a pleasant coconut aroma, a clean taste, and no acidity. Rich in medium-chain fatty acids, minerals, and phytonutrients, it is considered a functional superfood with numerous health benefits. In hair

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care, coconut oil deeply moisturises and conditions hair due to its lauric acid content, which allows better penetration into hair strands. Regular use helps nourish, soften, and add shine to hair, while also repairing dryness and damage, leaving hair smoother and healthier.⁽¹⁰⁾

Role:- Masks hair, Moisturises hair , Makes hair look shiny⁽¹⁰⁾



Olive Oil:-



Olive oil (Synonyms: Salad Oil, Sweet Oil) is a fixed oil obtained by expression of the ripe fruits of *Olea europaea* Linn. (Indian olive), belonging to the family *Oleaceae*. It mainly contains triacylglycerols (about 99%), which are esters of glycerol with fatty acids, primarily oleic acid. Olive oil acts as a natural emollient that deeply moisturizes hair, reduces frizz, and adds shine by smoothing the cuticle. It nourishes the scalp, soothes dryness and dandruff, and strengthens hair by improving elasticity and preventing split ends, leaving it soft, healthy, and lustrous.⁽⁹⁾

Role:- Moisturizing agent, Improves hair elasticit , Nourishing and conditioning agent⁽⁹⁾

Method of formulation of herbal hair lotion :

SR. NO	INGREDIENTS	FUNCTION	F1 (100ml)	F2 (100ml)	F3 (100ml)	F4 (100ml)	F5 (100ml)
1	Hibiscus flower extract	Strength & shine	6%	4%	6%	2%	2%
2	Aloe Vera gel	Moisturizer & soothes scalp	20%	20%	20%	30%	30%
3	Neem leaves extract	Antibacterial & antidandruff	6%	4%	1%	1%	1%
4	Ginger powder extract	Improve blood circulation	4%	0.5%	1%	1%	1%
5	Bhringraj powder extract	Promotes hair growth	6%	6%	3%	3%	3%
6	Fenugreek extract	Conditions, reduces hair fall	4%	6%	3%	3%	2%
7	Coconut oil	Nourishes scalp & hair	10%	10%	15%	10%	10%
8	Olive oil	Softens hair, antioxidant	10%	10%	10%	10%	10%
9	Almond oil	Condition hair, vitamin E	6%	5%	5%	10%	10%
10	Sodium benzoate	preservative	1%	0.5%	1%	1%	1%
11	shikakai	Mild cleanser, strengthens roots	4%	4%	5%	4%	4%



12	Rosemary leaves	Stimulating hair growth, antifungal	5%	8%	6%	6%	6%
13	Green tea leaves	Antioxidant reduces hair fall	4%	4%	2%	1%	2%
14	flaxseed	Thickener /conditioner, provides omega-3s	8%	10%	20%	20%	20%
15	Triphala powder extract	Antioxidant, strengthens roots	6%	8%	4%	3%	3%

Method of preparation

Water phase:

Cleaned all the glassware and dried it properly as per SOP.

Measure all ingredients accurately.

Take a flaxseed and aloe vera extract in a beaker and boil for 30-45 minutes in a water bath.

After 45 minutes, strain/filter out the gel from flaxseed and aloe vera extract.

Then cool it down at room temperature.



Oil Phase A:

Measure all the necessary herbs accurately.

Take all the oil in a beaker and add herbs in it.

And then boil it in the water bath for 15 minutes.

After boiling, cool down the herbal oil for 10 minutes

and filter out the oil from the extract.



Oil phase B:

Take the agar in the given quantity and add it to 15 ml glycerine.

Then boil it for 1-2 minutes in a water bath. Preparation of Herbal Hair Lotion:

Slowly add the oil phase A into the water phase while continuously blending.

Continues mixing until a smooth paste is formed.

Then add chemicals such as sodium benzoate as a preservative and oil phase B and mix it well.

Take the required amount of beeswax in a china dish and boil it on the hot plate for 5 minutes.

Mix the solution in a mechanical stirrer until the smooth paste is obtained.

At last add the rose oil for the fragrance.



Evaluation parameter of herbal hair lotion :

Physical Appearance:-

Method : The herbal hair lotion is examined visually for color, clarity, uniformity, and presence of any foreign particles or phase separation⁽²⁰⁾

DESCRIPTION : All Formulations (F1 to F5) exhibited pleasant odour, semisolid consistency , and slight colour variations indicating uniform texture, stability and acceptable sensory properties.

Determination Of PH-

Method : The pH of the herbal hair lotion is measured using a calibrated digital pH meter by immersing the electrode directly into the lotion or its aqueous dispersion and recording the stable reading.⁽²¹⁾

Parameter	F1	F2	F3	F4	F5
pH	5.2	5	5.7	5.5	5.5

DESCRIPTION: The PH of all formulations ranges between 5.2 to 5.7 which is the ideal range for hair and scalp application ensuring good compatibility and minimal irritation potential.

Skin irritation test –

Method: A small amount of herbal hair lotion is applied on a patch of skin and kept for 24 hours. The area is observed for redness, itching, or irritation.⁽²²⁾

parameter	F1	F2	F3	F4	F5
Irritation test	No	No	No	No	No

DESCRIPTION: F1 , F2, F3, F4, and F5 showed no signs of irritation ,conforming that the herbal ingredients used are safe for topical application and well tolerated by the skin.

Washability-

Method: A small amount of herbal hair lotion is applied to the skin or hair and then washed with running water. Ease and completeness of removal are observed visually. Good washability is indicated by easy removal without greasy residue.⁽²³⁾

Parameter	F1	F2	F3	F4	F5
Washability	poor	Good	Good	Good	Good

DESCRIPTION : F1 showed poor washability leaving slight traces of lotion after rising. F2, F3, F4, and F5 exhibited good washability with no visible residue remaining on the hair after washing .

Absorbency test –

Method: A small quantity of herbal hair lotion is applied to the skin and gently rubbed. The time taken for complete absorption and presence of any oily residue are observed. Rapid absorption without greasiness indicates good absorbency.⁽²⁴⁾

Parameter	F1	F2	F3	F4	F5
Absorbtion	Poor	Poor	Good	Good	Good

Parameters	F1	F2	F3	F4	F5
Colour	Light brown	yellow	Pale yellow	Pale yellow	Pale yellow
Odour	Pleasant	Pleasant	Pleasant	Pleasant	pleasant
consistency	Semisolid	Semisolid	Semisolid	Semisolid	Semisolid



DESCRIPTION: F1 and F2 showed poor absorption ,while F3, F4, and F5 batch exhibited good absorption indicating better formulation composition and efficient skin penetration. **Smoothness test –**

Method: A small amount of herbal hair lotion is applied and rubbed between the fingers or on the skin. Smoothness and absence of grittiness are assessed by touch. A smooth, non-gritty feel indicates good quality.⁽²⁵⁾

Parameter	F1	F2	F3	F4	F5
smoothness	Poor	Good	Poor	Good	Good

DESCRIPTION: F1 batch showed poor smoothness while f1,F2,F3,F4and F5 batches exhibited good smoothness texture .

Spread ability –

Method: A small amount of herbal hair lotion is placed between two glass slides and a standard weight is applied. The extent of spreading is measured; greater spreading indicates better spreadability.⁽²⁶⁾

Parameter	F1	F2	F3	F4	F5
Spreadability	Poor	Good	Good	Good	Good

DESCRIPTION :F1 batch showed poor spreadability while F2,F3,F4and F5 batches exhibited good spreadability indicating better uniformity ,ease of application and enhanced appeal of the formulations .

Stability Study-

STABILITY TESTING FOR BATCH F4

WEEK	1 WEEK	2 WEEK	3 WEEK	4WEEK	5WEEK
PARAMETER	F4	F4	F4	F4	F4
COLOUR	Pale yellow	Pale yellow	Pale yellow	Pale yellow	Pale yellow
ODOUR	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant
PH	5.5	5.5	5.5	5.5	5.5
SKIN IRRITATION TEST	No	No	No	No	No
WASHABILITY TEST	Poor	Good	Good	Good	Good
ABSORBENCY TEST	Poor	Poor	Good	Good	Good
SPREADABILITY TEST	Poor	Good	Good	Good	Good
SMOOTHNESS TEST	Poor	Poor	Poor	Poor	Poor

DESCRIPTION: Colour and Odour stayed stability pale yellow and pleasant and pH remained 5.5. No skin irritation occurred. Washability , absorbency , and spreadability improved after the 1st week . However smoothness remained poor even in the 5 week.

STABILITY TESTING FOR BATCH F5

WEEK	1 WEEK	2 WEEK	3 WEEK	4WEEK	5WEEK
PARAMETER	F5	F5	F5	F5	F5
COLOUR	Pale yellow	Pale yellow	Pale yellow	Pale yellow	Pale yellow
ODOUR	Pleasant	Pleasant	Pleasant	Pleasant	Pleasant
PH	5.5	5.5	5.5	5.5	5.5
SKIN IRRITATION TEST	No	No	No	No	No
WASHABILITY TEST	Good	Good	Good	Good	Good
ABSORBENCY TEST	Good	Good	Good	Good	Good
SPREADABILITY TEST	Good	Good	Good	Good	Good
SMOOTHNESS TEST	Good	Good	Good	Good	Good



DESCRIPTION: The colour remained pale yellow and the odour stayed pleasant throughout the study . The Ph was constant at 5.5 and no skin irritation was observed in any week . washability , absorbency , spreadability and smoothness were all good in all 5week, showing that F5 remained stable and constant .

II. SUMMARY AND CONCLUSION

Summary

Herbal hair lotion is a natural, plant-based formulation designed to nourish the scalp, strengthen hair roots, and promote healthy hair growth while minimizing side effects. Made with ingredients like aloe vera, rosemary, bhringraj, amla, neem, hibiscus, and essential oils, it helps reduce hair fall, dandruff, dryness, and irritation while enhancing shine, texture, and overall hair health. The prepared formulation, now widely recognized for its multi-functional benefits, acts as both a moisturizer and gentle scalp cleanser, making it suitable for all hair types and daily use. Evaluation of parameters such as pH, consistency, spreadability, washability, and scalp irritability confirmed its safety and effectiveness.

Conclusion

Herbal hair lotion represents a holistic, safe, and eco-friendly approach to modern hair care, combining traditional herbal wisdom with contemporary cosmetic science. Designed to nourish, protect, and rejuvenate the scalp and hair, the formulation offers an effective natural alternative to synthetic products, supporting healthier, shinier, and stronger hair with regular use. Among all formulations, the F5 batch proved to be the best, showing optimal thickness, pH, smooth texture, easy spreadability, non-stickiness, stability, and excellent hair-softening effects without irritation. As consumer demand for clean, plant-based, and sustainable beauty products grows, herbal hair lotions—especially the optimized F5 formulation—stand out as valuable additions to natural hair care regimens. Among all the formulated batches, the F5 batch was found to be superior compared to the other batches. It exhibited optimal physicochemical characteristics such as appropriate pH, better consistency, uniformity, spreadability, and enhanced stability.

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