

A Review on Formulation and Evaluation of Hair Gel Containing Leaf Extract of Mussaenda Frondosa

Ms. Jilby saju¹, Fersina Nowshad², Jasnamol Latheef³, Safna
Haneefa⁴, Sethulakshmi Jayan⁵

¹Associate Professor, Department of Pharmaceutics, Al Azhar College of
Pharmacy, Thodupuzha, Kerala, India

^{2,3,4,5} Students of Al Azhar College of Pharmacy Thodupuzha, Kerala, India

Date of Submission: 10-01-2025

Date of

Acceptance: 20-01-2025

ABSTRACT

Dandruff is a common scalp disorder characterized by flaking, itching and redness. As the prevalence of increasing dandruff problem associated with youth and the increasing side effects by usage of synthetic hair gel because of chemical ingredients, we are motivated to formulate natural hair gel. A natural and alternative hair gel help to remove dandruff. Also it is safe to use. It can promote hair growth, itchiness, and irritation, and improve overall hair and scalp health. Mussaenda frondosa, a topical plant, has been traditionally used in folk medicine for various ailments, including skin and scalp disorders. Mussaenda frondosa shows potent anti-dandruff activity. The objective of the study is to summarize the preparation, evaluation, and efficacy of Mussaenda Frondosa leaf extract hair gel against dandruff. Hair gel gives necessary nutrients to your hair gel is used makes your look attractive. Hair gels initially gained popularity as they helped the hair to be kept in an undisturbed, uniform state throughout the day. The herbal hair serum contain Mussaenda frondosa leaves were used in the formulation.

KEY WORDS: Mussaenda frondosa, dandruff, hair gel, scalp disorder.

Cosmetology is the field of science and art that focuses on the study of cosmetics and how to use them to enhance and beautify the skin, hair, nails, and face. The word "cosmetics" is derived from the Greek word "kosmetikos," meaning "skilled in the use of cosmetics." "Cosmetic are external preparation meant for to apply on external part of the body i.e., nails, skin, and hair for colouring, covering, softening, cleaning, nourishing, waving, setting, mollification, preservation, removal, and protection," according to the Federal Food, Drug, and Cosmetic Act (FD&C), which defines cosmetics by their intended use. "An item intended to be rubbed, poured, sprinkled, or sprayed on, introduced into, or otherwise applied to the human body for cleansing, beautifying, promoting attractiveness, or altering the appearance" is called a cosmetic, according to the World Health Organization.

Cosmetics like foundation, eye shadow, mascara, and lipstick are referred to as makeup. Nail polish, body wash, moisturizers, and fragrances are examples of additional cosmetics. With the exception of colour additives, cosmetic items and ingredients are exempt from FDA approval prior to being put on the market under the FD&C Act. Any substance intended for use as a component of a cosmetic may be applied to the human body or any part of it for the purposes of cleaning, beautifying,

I. INTRODUCTION COSMETICS

increasing attractiveness, or altering appearance, according to the Cosmetic Act of 1947.

All cosmetic preparations are applied for varying lengths of time to enhance physical appearance, maintain some degree of physical health, and have an effect on others' psychological well-being. Any cosmetic preparation's "active life" starts as soon as it comes into contact with skin, hair, teeth, or nails and ends when it is removed or evaporates. Cosmetics that are applied decoratively—such as eye lines, rouge, mascara, face mask bases, etc.—also carry the possibility of positive unintended side effects. [01]

HAIR GEL

Hair gel: A hairstyling product named hair gel is used to bind hair into a specific style. One of the most often used hair style products nowadays is hair gel. Formulating and assessing a herbal gel for hair nourishing and moisturizing is the goal of the current research. Hair gels aid in keeping your hair hydrated, which is vital for healthier growth. When applied, hair gel gives your hair the nutrition it needs to appear good. Because they retained hair in an identical undisturbed state throughout the day, hair gels initially got popular. All hair types, especially curly, wavy, dyed, and relaxed hair, are able to handle with hair gels. Overuse of hair gel could end up in decreased hair growth. It falls down to selecting an ideal hair gel product. It takes very little time for the scalp's pores to unclog; excessive use guarantees that they stay blocked. Low-quality hair gels can harm your hair. When applied to slightly damp hair, hair gel performs at its finest.

Ideal properties

- It should appear as homogenous and viscous in nature.
- It should provide smooth and shining texture.
- It must be providing stiffness.
- It must be non-irritant.

Uses

- It can hold moisture and protect the

hair.

- Enhance and define curls.
- Lengthen the Hair & Style the Hair.
- It should create a flexible hold & shine

Types of Hair Gel:

- **Water based pomade:** Water based pomades are water soluble, they wash out easily with water. With a firm hold, natural shine, a clean and crisp cedar scent our gel makes looking good to easy
- **Oil based pomade:** These are traditional hair greases that have been in natural oils in these pomades promote high levels of shine. These products do not dry completely after application.
- **Hybrid pomade:** This hybrid pomade is a water soluble cream that feels like a firm version of their oil based pomade. Goes into the hair with ease and washes out offer one shampoo. [2]

DANDRUFF

Dandruff is a chronic scalp condition that is characterized by itching and flaky white to yellowish scales that are caused by corneocytes that form clusters because of their strong gluing power. Since sebaceous glands are at their most active at this time, dandruff has been found to mostly occur between adolescence and middle age. There are two categories of causes: a) microbial and b) non-microbial. The most common cause of dandruff is thought to be *Malassezia furfur*, a variety of active components used to treat dandruff, such as keratolytic, anti-fungal, and anti-proliferative agents. [3]

PLANT PROFILE

MUSSAENDA FRONDOSA



Synonym:Gardenia frondosa,
Mussaendasericea.

Biological Classification:

Kingdom : Plantae
Phylum : Streptophyta
Class : Equisetopsida
Order : Gentianales
Family : Rubiaceae
Genus : Mussaenda
Species : Mussaenda frondosa [5]

Chemical constituents: It consist of flavonoid, phenol, Terpenoids, alkaloids, saponins and glycosides.

Description:It is believed that Mussaenda frondosa is a scan dent shrub. Broadly oval leaves with rounded bases and scant fur on both surfaces. One of the five sepals in every pair of orange-yellow tubular blooms has expanded into the shape of a white petal. The flavonoid and phenolic fraction were to blame for the antifungal and antibacterial effects. Extracts of the leaves of the plant Mussaenda frondosawere tested for antifungal and antibacterial properties against both Gram-positive and Gram-negative bacteria using methanol, chloroform, ethyl acetate, and hexane.[4]
Uses:It is traditionally used in inflammation, wound, cough, skin infection, jaundice etc.

Benefits:It purifies hair, encourages hair development, stimulates the scalp, enhances hair texture, lessens graying, and uses natural dye.

METHODOLOGY

1. COLLECTION OF PLANT

The plant is often produced at the end of the year and is a perennial. The spring and summer are when the plants are supposed to be cultivated. After harvesting, let the leaves air dry.

FORMULATION OF HAIR GEL

INGREDIENTS	QUANTITY 5MG/ML	TAKEN	CATEGORY
Mussaenda Frondosa	2.5gm		Antibacterial & Antifungal
Aloe Extract	1gm		Moisturizer
Xanthan gum	0.45gm		Gelling agent
Amla Juice	1gm		Hair nourishment

2.PREPARATION OF LEAF EXTRACT

The freshly gathered plant material was approximately ground, shade-dried, and chopped into tiny bits. In an aspirator container, the powdered material was extracted using the cold percolation method for 72 hours using n-hexane (HEMF), chloroform (CEMF), ethyl acetate (EEMF), and methanol (MEMF) in turn. A rotary evaporator was used to filter and concentrate the extract. HPTLC analysis, phytochemical screening, and antibacterial activity tests have been conducted on these extracts. [6]

- Preparation of ethanol extract: Using a Soxhlet equipment, the powdered material was effectively extracted with 95% ethyl alcohol. In a vacuum, the extract was concentrated until it had the consistency of syrup.

3. FORMULATION OF HERBAL HAIR GEL

Weigh out the necessary amount of xanthan gum and mix it with 25 ml of distilled water in a beaker. Set the beaker aside for 30 minutes to enable the xanthan gum to swell, and then begin stirring for 30 minutes at 1200 rpm using a mechanical stirrer. Solution A: In a beaker, blend 1g or 2.5g of Mussaenda frondosa extract with 5 ml of glycerin, mixing gently. Solution B: Fill another beaker with 5 ml of glycerin, aloe juice, amla juice, and phenol. Stir frequently while dispersing Solutions A and B in xanthan gum. Lastly, add the remaining ml of distilled water to equal fifty ml of formulation. Then, gradually add triethanolamine to the formulation until the pH reaches neutral and the gel reaches the desired consistency. [8]

Glycerin	10.4gm	Humectants
Phenoxyethanol	0.1gm	preservatives
Triethanolamine	1-2drops	PH Adjuster
Water	QS	Vehicle

4. PHYTOCHEMICAL SCREENING

Detection of phenols

- o **Ferric chloride test:** Ferric chloride test: Fill a clean test tube with 1 ml of leaf extract. Put in a 5% solution of neutral ferric chloride. Phenolic chemicals and tannins are identified by a purple or violet colour.

Detection of Terpenoids

- o **Salkowski test:** Fill a clean test tube with 1 ml of leaf extract. To create a layer, place a few ml of concentrated sulfuric acid and chloroform around the test tube's walls. Terpenoids are indicated by a reddish brown color near the contact.

Detection of alkaloids

- o **Mayer's test:** Fill a clean test tube with 1 ml of leaf extract. Put in some Mayer's reagent. The amount of alkaloids is indicated by the production of cream foam.
- o **Dragendorff's test:** Fill a clean test tube with 1 ml of leaf extract. To that, add Dragendorff's reagent. Alkaloids are identified by a reddish-brown precipitate.
- o **Wagner's test:** Fill a clean test tube with 1 ml of leaf extract. To that, add Wagner's reagent. Alkaloids are visible when the precipitate is red in hue.
- o **Hager's test:** Fill a clean test tube with 1 ml of leaf extract. Put in the Hager's reagent. The presence of alkaloids can be detected by a yellow precipitate.

Detection of saponins

- o **Foam test:** Fill a clean test tube with 1 ml of leaf extract. Shake thoroughly

after adding 1 to 2ml of pure water. The actual existence of saponins is indicated by the development of foam.

Detection of flavonoids

- o **Lead acetate test:** Fill a clean test tube with 1 ml of leaf extract. To it, add 1 to 2 ml of lead acetate solution. The presence of flavonoids can be recognized by the formation of a strong yellow color. [8]

Anti-bacterial studies

When tested on pathogenic bacteria at different dose levels, the leaf extracts of *Mussaenda frondosa*, especially HEMF, CEMF, EEMF, and MEMF, were found to be effective against all pathogenic bacteria, involving *salmonella typhi*, *pseudomonas aeruginosa*, *vibrio cholerae*, *Escherichia coli*, and *Staphylococcus aureus*. *Pseudomonas aeruginosa*, *Salmonella typhi* (Gram Positive) and *Staphylococcus* and *Vibrio cholera* (Gram Negative) are suppressed by the MEMF at a dose of 100µg/ml and 133.33µg/ml, respectively. The bacterial strains were slightly controlled by the EEMF, CEMF, and HEMF extracts.

Anti-Fungal studies

In Sabouraud Dextrose Agar slants, MEMF, EEMF, CEMF, and HEMF all demonstrated antifungal activity. *Aspergillus Niger* and *Rhizopus*, the bacteria that cause *Tinea Cruis*, *Tinea pedis*, and *Tinea capitis*, were tested against the extracts at varying dose levels. In the agar slants, the extracts substantially restrict the growth of fungus. At 100 µg/ml, the MEMF inhibits *A. Niger* and *Rhizopus*, while the EEMF shown modest inhibition. [6]

5. EVALUATION OF HERBAL HAIR GEL

➤ Organoleptic Properties

- ♣ Colour
- ♣ Odour
- ♣ Appearance

- **pH:** Using a digital pH meter, the gel formulation's pH was confirmed. After dissolving one gram of gel in 100 ml of distilled water, the pH was measured three times, and the average was computed.
- **Homogeneity:** After the developed gel was set in the container, its homogeneity was visually assessed. Its appearance and the existence of any aggregates or flocculates were examined.
- **Spreadability:** It is determined by using parallel plate method. Spreadability was calculated by using formula.

$S = M \cdot L / T$

S= Spreadability

M= Weight placed on the slide

L=diameter of circle in cm

T=time in seconds.

- **Washability:** The prepared hair gel formulation is applied on the skin and then ease and extent of washing with water is checked normally.
- **Extrudability:** The prepared hair gel formulation is filled into collapsible tubes. The tube is pressed to extrude the material and the Extrudability of the formulation was checked.
- **Skin irritation test:** Applied the herbal hair gel formulation on the skin and observe for irritation, redness or rashes.
- **Anti-fungal activity:** The therapeutic effectiveness of antifungal medications may be demonstrated by the inhibition of fungal growth under controlled settings. The cup-plate method, which relies on the medication diffusing from the gel within the cup through a solidified agar layer in the petridish to the extent that the growth of the added microbe is entirely inhibited in a zone encircling the cup, was used to evaluate the gels microbiologically. Better drug release from the base is suggested by a wider zone of inhibition.

[7]

- **Stability study:** The capacity of a given formulation to stay within its physical, chemical, therapeutic, and toxicological parameters in a given container is known as a drug's stability. Stability testing helps determine recommended storage conditions, retest periods, and shelf lives by demonstrating how the quality of a drug substance or drug product modifies over time under the influence of various environmental factors like light and humidity. In the present work the formulation was stored at room temperature (25–30°C) for 30 days and observed for any changes in their physical characteristics and evaluation parameter. [8]

II. CONCLUSION

Hair gel is the most important part of the modern life. As they are mainly used for the hair beautification purpose, their demand increases vigorously. The functional properties of cosmetic hair gel are significantly higher than most cosmetics. The higher moisturizing, antioxidant, stiffness and shining property of the hair gel which is more attracting instead of any other cosmetic products such as creams, lotions, serums. Gel containing rutin, quercetin, hyperin, singapic acid, Ferulic acid are most commonly preferred for scalp health. *Mussaenda frondosa* has been used since ancient times to nourish and rejuvenate the hair. Phenols and flavonoids are the main constituents that shows antidandruff property. The amount of phenols varies due to climate conditions and region of cultivation. The various articles that we reviewed shows antifungal activity and anti-bacterial activity is due to the presence of phenols and flavonoids which is present in *Mussaenda frondosa*. So we are planning to prepare *Mussaenda frondosa* leaf extract incorporated hair gel for the treatment of dandruff and other hair related problems.

BIBLIOGRAPHY

- [1]. Shailendra Saraf and Swarnlata

- Saraf, introduction to cosmetics, Cosmetics A Practical Manual, 3rd Edition, BSP Books, Introduction of Cosmetics, Page no:05-07.
- [2]. Abbaraju Krishna Sailaja and Kona Madhuri, Comparative Study of Various Brands of Synthetics Hair Gels and Herbals Hair Gel, Clinical Case Report and Clinical Study, Vol-1, Issue-1, Page no:2-5
- [3]. M. Narshana and P. Ravikumar, An overview of dandruff and novel formulations as a treatment strategy, International Journal of Pharmaceutical Sciences and Research, 2018, Volume-9, Issue-2, Page No: 417-419
- [4]. Shanthi.S, Pharmacognostical studies on leaves of *Mussaenda frondosa* Linn, International Journal of Research in Pharmaceutical Science, 2021, vol-12, Issue-3 Page no;2139-2141
- [5]. Rajbhandari, K.R., Rai, S.K. & Chhetri, R. (2022), Scientific Classification of *Mussaenda Frondosa*, Plants of the World Online, page no;2
- [6]. S. Shanthi, R. Radha, 2020 Anti-microbial and Phytochemical Studies of *Mussaenda frondosa* Linn. Leaves, A Multifaceted Journal in the field of Natural Products and Pharmacognosy, 2020; Vol 12; issue-3 Page No 631-633
- [7]. Ramakrishna S & Gopikrishna U. V Formulation and Evaluation of Herbal Hair Gel, Scholars International Journal of Traditional and Complementary Medicine, vol-5 issue- 2 Page No 28-32
- [8]. Nilofar Khan, Prajwal Jadhav, Srushti Jagadale, Komal Kachare, Shravani Kamble, Shivani Gandhe, Rupali Yewale, Dr. Mohan Kale and Shubhangi Kshirsagar, Formulation and evaluation of polyherbal hair gel formulation, Journal of Pharmacognosy and Phytochemistry 2022; vol -11, issue -1, Page No: 32-36