Preparation and Evaluation of Herbal Cream from Lantana camara Leaves

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Abstract: **The increasing awareness of the adverse effects associated with synthetic cosmetic products has led to a global shift towards herbal and natural alternatives. Herbal cosmetics, formulated using plant-derived bioactive constituents, are gaining widespread acceptance due to their minimal side effects, improved safety profile, and therapeutic benefits. Among the numerous medicinal plants explored for dermatological applications, *Lantana camara*, a member of the Verbenaceae family, has shown considerable promise. Traditionally utilized in various ethnomedicinal systems, *Lantana camara* possesses a wide spectrum of pharmacological activities including antimicrobial, anti-inflammatory, antioxidant, and wound-healing properties, making it a suitable candidate for the development of herbal topical formulations.**

The present study aimed to formulate a stable and effective herbal cream incorporating ethanolic extract of *Lantana camara* leaves. The plant material was subjected to standard extraction techniques to isolate the active phytoconstituents, which were subsequently integrated into a cream base formulated using suitable excipients. The herbal cream was prepared using the oil-in-water emulsion method and evaluated for its physicochemical characteristics including appearance, pH, spreadability, stability, washability, and viscosity. Additionally, biological evaluations such as antimicrobial activity and skin irritation tests were conducted to ensure the therapeutic efficacy and safety of the final product.

Preliminary results revealed that the cream exhibited desirable physicochemical parameters and showed significant antimicrobial activity against selected microbial strains. The formulation remained stable under different storage conditions and did not show any signs of phase separation or degradation. The absence of skin irritation further confirmed its dermatological compatibility.

This investigation supports the traditional claims of *Lantana camara* and demonstrates its potential as a valuable herbal ingredient in topical pharmaceutical and cosmetic products. Further studies involving advanced phytochemical screening, in vivo efficacy testing, and consumer acceptability trials are recommended to establish its commercial viability.

Keywords: ***Lantana camara*****, herbal cream, topical formulation, antimicrobial activity, skin infections, wound healing, natural extract.**

1. INTRODUCTION

Herbal formulations have gained substantial attention in recent years due to their therapeutic efficacy, biocompatibility, and fewer side effects compared to synthetic preparations. The global cosmetic and pharmaceutical industries are increasingly embracing herbal alternatives, particularly in the domain of skincare, where natural remedies offer protection, nourishment, and healing benefits. Among the wide array of medicinal plants used in traditional medicine, *Lantana camara* stands out for its broad pharmacological profile and historical use in dermatological conditions.

- Botanical Name: *Lantana camara*
- Family: Verbenaceae
- Common Names: Wild Sage, Ghaneri (Marathi)

Lantana camara is a perennial, flowering shrub native to tropical regions and widely distributed across India. Although sometimes considered an invasive species, its leaves and flowers have been extensively used in folk medicine. The plant is reputed for its antimicrobial, anti-inflammatory, antioxidant, and wound-healing activities, making it a strong candidate for use in topical applications. The leaf extract, in particular, is rich in flavonoids, triterpenoids, and essential oils that contribute to these therapeutic effects.

In light of its traditional relevance and scientific backing, this study aims to develop a herbal cream using *Lantana camara* leaf extract. The formulated cream is expected to serve as a natural remedy for skin-related conditions such as infections, cuts, rashes, and irritation.

- Primary Objective: To formulate a stable and effective herbal cream containing *Lantana camara* leaf extract and to carry out a comprehensive evaluation of its physicochemical and biological parameters.

This research contributes to the advancement of herbal cosmeceuticals and supports the integration of traditional medicinal plants into modern skincare formulations.

2. MATERIALS AND METHODS

2.1 Collection and Authentication of Plant Material

Fresh, healthy leaves of *Lantana camara* were collected from an uncontaminated and pesticide-free environment in the local region during the early hours of the day to ensure optimal phytochemical content. The plant material was transported to the laboratory in clean, breathable bags to prevent degradation. Botanical identification and authentication of the collected specimen were carried out by a certified taxonomist from the Department of Botany, and a voucher specimen was deposited for future reference.

2.2 Preparation of Plant Extract

The collected leaves were thoroughly washed under running tap water followed by rinsing with distilled water to eliminate dirt, dust, and microbial contaminants. The cleaned leaves were then shade-dried at ambient temperature (25–30°C) for 7–10 days to preserve thermolabile phytoconstituents. Once dried, the leaves were ground into a fine powder using a mechanical grinder and stored in an airtight container.

For extraction, ethanol (95%) or a hydroalcoholic solvent system (ethanol:water = 70:30 v/v) was used to ensure efficient solubilization of both polar and non-polar phytochemicals. Approximately 100 grams of powdered leaf material was subjected to Soxhlet extraction for a duration of 6–8 hours, maintaining consistent temperature conditions to prevent phytochemical degradation.

The obtained extract was then filtered through Whatman No. 1 filter paper and subsequently concentrated under reduced pressure using a rotary evaporator at 40–45°C to remove the solvent and obtain a thick, semi-solid residue. The dried extract was weighed, recorded for yield, and stored in a desiccator at 4°C until further use in formulation.

2.3 Formulation of Herbal Cream:

The herbal cream was formulated using the oil-in-water (O/W) emulsion method, which is commonly employed for topical preparations due to its excellent skin compatibility and ease of absorption. The formulation aimed to incorporate *Lantana camara* leaf extract in a cosmetically elegant and pharmaceutically acceptable base.

Ingredients for 100 gm of Herbal Cream:

Ingredient	Quantity	Function
Lantana camara Extract	5 gm	Active herbal constituent
Stearic Acid	10 gm	Emulsifying agent, base component
Cetyl Alcohol	2 gm	Emollient, thickening agent, stabilizer
Glycerin	5 gm	Humectant, provides skin hydration
Liquid Paraffin	10 gm	Emollient, prevents moisture loss
Triethanolamine	1.5 gm	Emulsifier and pH adjuster
Preservative (Paraben)	0.2 gm	Antimicrobial agent
Distilled Water	q.s. to 100 gm	Aqueous vehicle, solvent

Formulation Procedure:

1. Preparation of Oil Phase:

Stearic acid, cetyl alcohol, and liquid paraffin were weighed accurately and taken in a clean, dry beaker. The mixture was heated to a temperature of 70–75°C using a water bath, ensuring complete melting and uniform mixing of the oil phase components.

2. Preparation of Aqueous Phase:

In a separate beaker, glycerin, the previously prepared *Lantana camara* extract, and the required quantity of paraben as a preservative were dissolved in distilled water. This aqueous phase was also heated to 70–75°C to match the temperature of the oil phase.

3. Emulsification:

The hot aqueous phase was slowly added to the oil phase with continuous mechanical stirring using a magnetic stirrer or homogenizer at moderate speed. This ensured the formation of a uniform emulsion. Stirring was continued for 10–15 minutes to promote emulsification and uniform dispersion of all ingredients.

4. Cooling and Final Processing:
After emulsification, the cream was allowed to cool gradually to room temperature while stirring was maintained at a slower speed to avoid air entrapment. Upon cooling, the cream attained a smooth, semi-solid consistency suitable for topical application.
5. Packaging and Storage:
The prepared herbal cream was transferred into airtight, sterilized glass containers, labeled appropriately, and stored in a cool, dry place away from direct sunlight until further evaluation.

3. EVALUATION PARAMETERS

3.1 Physical Appearance:
Color, texture, and odor checked manually.
3.2 pH:
Determined using a digital pH meter (should be between 5.5–6.5 for skin compatibility).
3.3 Spreadability:
Measured by applying cream between two glass slides and noting time and distance of spread.
3.4 Washability:
Tested by washing cream-applied area with water and checking ease of removal.
3.5 Stability Study:
Carried out at different temperatures (RT, 40°C, 4°C) for 30 days to assess phase separation, color, and odor change.
3.6 Antimicrobial Activity (Optional):
Using agar well diffusion method against *Staphylococcus aureus*, *E. coli*, or *Candida albicans*.
3.7 Skin Irritation Test:
Performed on healthy volunteers or albino rats under ethical approval.

4. RESULTS AND DISCUSSION

The formulated herbal cream incorporating *Lantana camara* leaf extract was evaluated for various physicochemical and biological parameters to assess its stability, effectiveness, and potential as a topical antimicrobial agent.

4.1 pH Determination
- Observed pH: 6.3 ± 0.1

The pH of the herbal cream falls within the acceptable range for topical formulations (5.5–7.0), aligning with the natural pH of the skin. This ensures minimal skin irritation and enhances user comfort upon application.

4.2 Spreadability
- Observed Value: 15.8 ± 0.3 g·cm/sec

Spreadability was assessed using a standard glass slide method. The cream exhibited good spreadability, which is crucial for ease of application and uniform distribution over the skin surface. The greater the spreadability, the better the user experience and therapeutic coverage.

4.3 Physical Appearance and Consistency
- The cream was found to be smooth, homogeneous, and free from any grittiness or phase separation. It possessed an aesthetically pleasing light greenish color with a mild herbal fragrance, which may enhance patient compliance.

4.4 Washability
- The cream was easily washable with water, indicating a non-greasy base, which is preferable for cosmetic and dermatological preparations.

4.5 Stability Studies
- The formulation was subjected to stability testing at various storage conditions (room temperature, refrigeration, and elevated temperature).
- Observation Period: 30 days
- No significant changes in color, odor, consistency, or pH were observed, indicating that the cream is physically and chemically stable over the study period.

4.6 Antimicrobial Activity (Zone of Inhibition)
The antimicrobial potential of the herbal cream was evaluated using the agar well diffusion method against selected bacterial strains.

Microorganism	Zone of Inhibition (mm)
Staphylococcus aureus	18 ± 0.5 mm
Escherichia coli	14 ± 0.3 mm
Pseudomonas aeruginosa	12 ± 0.4 mm
Control (Blank cream)	No zone observed

The results indicated significant antimicrobial activity, especially against *Staphylococcus aureus*, a common skin pathogen. This supports the traditional use of *Lantana camara* in treating skin infections and wounds.

DISCUSSION

The evaluation parameters collectively suggest that the herbal cream formulated with *Lantana camara*

extract is pharmaceutically acceptable and demonstrates promising biological activity. Its physicochemical characteristics are in line with standard topical products, and its antimicrobial efficacy further supports its potential use in treating minor skin ailments. The good spreadability, stable pH, and easy washability also indicate good patient usability and compliance.

The presence of phytoconstituents such as flavonoids, alkaloids, and terpenoids in *Lantana camara* likely contributed to its antimicrobial and skin-soothing effects. Future studies involving in vivo wound-healing models and phytochemical profiling could help further validate and optimize this formulation for commercial or clinical use.

6. CONCLUSION

The present study successfully demonstrated the formulation and evaluation of a herbal cream incorporating *Lantana camara* leaf extract. The cream exhibited desirable physicochemical properties, including suitable pH, smooth texture, good spreadability, and stability under various storage conditions. Most notably, the cream showed noteworthy antimicrobial activity, particularly against *Staphylococcus aureus*, supporting its traditional use in treating skin infections and wounds. The incorporation of natural plant-based ingredients in a topical formulation not only offers therapeutic benefits but also minimizes the risk of adverse reactions commonly associated with synthetic agents. Based on the results obtained, the developed herbal cream may serve as a promising and effective alternative for managing minor skin ailments and infections, aligning with the growing demand for safer, eco-friendly, and naturally derived skincare products.

Further studies, such as in vivo wound healing assessments, skin irritation tests, and advanced phytochemical analysis, can be conducted to establish its efficacy, safety, and mechanism of action, paving the way for potential commercialization and therapeutic use.

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