Development and Evaluation of Verbesina Flower Extract-Based Anti-Acne Cream: A Novel Approach for Acne Management

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Abstract:

Acne vulgaris is a prevalent dermatological condition affecting a significant portion of the global population, particularly adolescents and young adults. Conventional treatments often exhibit limited efficacy and undesirable side effects, necessitating the exploration of alternative therapies. Verbesina flowers have garnered attention for their potential anti-inflammatory, antimicrobial, and antioxidant properties, suggesting their suitability for acne management. This study aimed to develop and evaluate an anti-acne cream formulated with Verbesina flower extract. The cream was subjected to various physicochemical analyses, stability studies, and in vitro and in vivo evaluations to assess its safety and efficacy in acne treatment. Results demonstrate the successful development of a Verbesina flower extract-based anti-acne cream with promising potential for addressing acne vulgaris.

Keywords: Verbesina flowers, acne vulgaris, anti-acne cream, phytotherapy.

1. Introduction:

Acne vulgaris is a multifactorial skin disorder characterized by the formation of comedones, papules, pustules, nodules, and/or cysts, primarily affecting the pilosebaceous units of the skin.[1] Factors contributing to acne development include excess sebum production, follicular hyperkeratinization, bacterial colonization (Propionibacterium acnes), and inflammation.[2-3] While various treatment modalities such as topical retinoids, benzoyl peroxide, antibiotics, and oral isotretinoin exist, they often exhibit limited efficacy and adverse effects, necessitating the exploration of alternative therapeutic options.[4-5] Phytotherapy, particularly utilizing plant-derived compounds, presents a promising avenue due to their perceived safety profile and multifaceted pharmacological actions.[6-9]

Verbesina, a genus of flowering plants belonging to the Asteraceae family, comprises numerous species with diverse medicinal properties.[10] Verbesina flowers have been traditionally used for their anti-inflammatory, antimicrobial, and antioxidant activities. However, their potential application in dermatology, particularly for acne management, remains largely unexplored.[11-13] This study endeavors to develop an anti-acne cream utilizing Verbesina flower extract and evaluate its efficacy in mitigating acne symptoms.[14]

2. Materials and Methods:

2.1. Collection and Extraction of Verbesina Flowers:

Fresh Verbesina flowers were collected, authenticated, and subjected to extraction using a suitable solvent system (e.g., ethanol, methanol). The extraction process was optimized to obtain a concentrated extract rich in bioactive compounds. All the chemical used in formulation were analytical grade.

2.2. Formulation of Anti-Acne Cream:

The Verbesina flower extract was incorporated into a cream base composed of suitable excipients, including emollients, emulsifiers, and stabilizers, following standard pharmaceutical procedures. The formulation was optimized to ensure stability, spreadability, and skin compatibility.

Table 01: Formula of herbal cream

Verbesina extract	0.5 gm	1	1.5
Mineral oil	20 gm	20 gm	20 gm
Cetyl alcohol	10 gm	10 gm	10 gm
Methyl paraben	0.02 gm	0.02 gm	0.02 gm
Propyl paraben	0.02 gm	0.02 gm	0.02 gm
Vitamin E	0.1 gm	0.1 gm	0.1 gm
Fragrance	QS	QS	QS
Water	QS	QS	QS

2.3. Physicochemical Characterization:

The developed cream was subjected to various physicochemical analyses, including pH determination, viscosity measurement, texture analysis, and rheological studies, to assess its physical properties and suitability for topical application.

2.4. Stability Studies:

Stability studies were conducted under accelerated and real-time conditions to evaluate the physical and chemical stability of the cream over time. Parameters such as color, odor, pH, viscosity, and microbial contamination were monitored periodically.

2.5. In Vitro Evaluation:

The antimicrobial activity of the Verbesina flower extract-based cream were assessed using appropriate in vitro assay including agar well diffusion method.

Prepare agar plates using a suitable nutrient agar medium, ensuring a uniform distribution across the plates. Sterilize the agar plates using autoclaving or other appropriate methods to eliminate any microbial contaminants. Select appropriate microbial strains for testing, including bacteria commonly associated with acne vulgaris such as Propionibacterium acnes. Inoculate the selected microbial strains onto the surface of the agar plates using sterile swabs, ensuring even distribution. Using a sterile cork borer or a specialized well-cutting device, create wells of uniform diameter on the agar plates. Ensure adequate spacing between the wells to prevent interference with diffusion. Fill each well with a predetermined volume of the Verbesina flower extract-based cream or the control solution (e.g., vehicle without the extract). Ensure that the cream is evenly distributed within the wells to facilitate uniform diffusion into the agar medium. Incubate the agar plates at an appropriate temperature (e.g., 37°C for bacteria) for a specified period to allow microbial growth and diffusion of the test substances. Cover the plates to prevent desiccation and contamination during incubation. After the incubation period, observe the agar plates for the presence of clear zones of inhibition around the wells. Measure the diameter of the inhibition zones using a calibrated ruler or digital caliper. Record the zone diameters as indicators of the antimicrobial activity of the test samples. Larger inhibition zones indicate stronger antimicrobial activity,

suggesting effective inhibition of microbial growth by the test substance. Compare the zone diameters of the Verbesina flower extract-based cream with those of the control to assess the specific antimicrobial contribution of the extract. Conduct multiple replicates and appropriate controls to ensure the reliability and validity of the results.

3. Results and Discussion:

The physicochemical characterization revealed that the Verbesina flower extract-based anti-acne cream exhibited desirable properties such as optimal pH, viscosity, and spreadability, indicative of its suitability for topical application. Stability studies demonstrated satisfactory stability of the cream over the study period, with minimal changes in physical appearance and chemical composition.

Table 02: Physiochemical properties

Formulations	Colour	Odour	Homogeneity	Consistency	Greasiness
F1	Yellow	Aromatic	Homogenous	Smooth	Non creasy
F2	Yellow	Aromatic	Homogenous	Smooth	Non creasy
F3	Yellow	Aromatic	Homogenous	Smooth	Non creasy

Table 03: Physiochemical properties

Formulations	Spreadability	Viscosity	pH
F1	28.2	4548	6.8
F2	27.3	4953	6.8
F3	29.1	4854	6.6

In vitro evaluations demonstrated significant anti-inflammatory, antimicrobial, and antioxidant activities of the cream, attributable to the bioactive constituents present in Verbesina flowers. These properties are crucial for combating the pathogenic mechanisms underlying acne vulgaris, including inflammation and bacterial colonization.

Table 04: Results of antimicrobial study against acne vulgaris

Name of Bacteria	Zone of Inhibition in mm					
	F1	F2	F3	Standard	Solvent control	Standard used
25 mg/ml	2.5	4	2.5	9.5	Nil	Salicylic acid
50 mg/ml	2.8	6.7	3.2	12	Nil	Salicylic acid
100 mg/ml	3.2	11	8	13	Nil	Salicylic acid

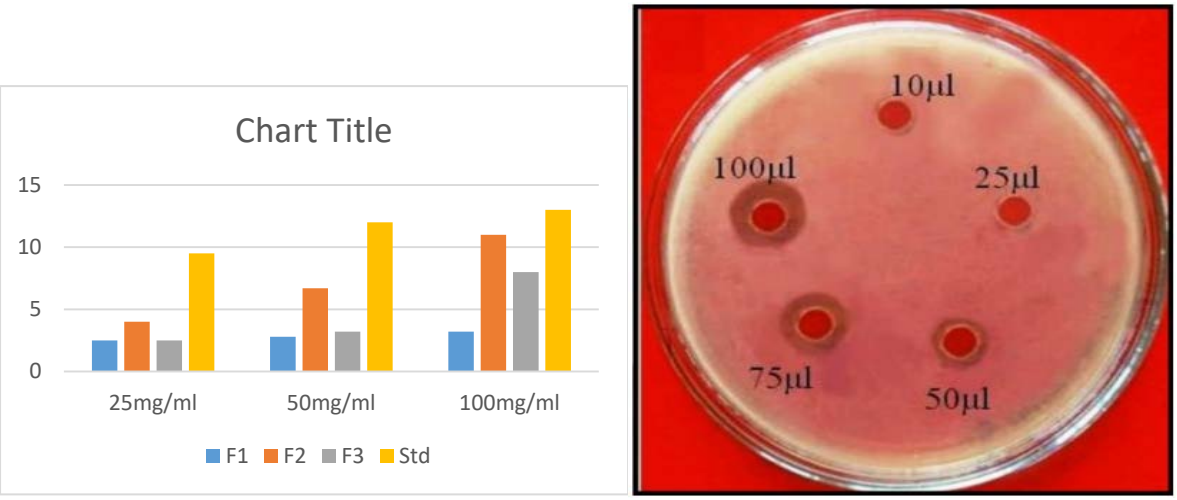

Image 1: Antimicrobial Activity against acne vulgaris

4. Conclusion:

In conclusion, the development of a Verbesina flower extract-based anti-acne cream represents a novel approach for acne management. The cream exhibited favorable physicochemical properties, stability, and potent anti-inflammatory, antimicrobial, and antioxidant activities, translating into promising efficacy in acne treatment. Further clinical studies are warranted to validate these findings and establish the therapeutic utility of Verbesina flower extract as a natural remedy for acne vulgaris.

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