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Formulation and Evaluation of Herbal Turmeric Cream

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Abstract: ***The creation and assessment of an herbal cream containing turmeric (Curcuma longa) extract—which has strong anti-inflammatory, antibacterial, antioxidant, and wound-healing qualities—is the main goal of this work. A straightforward emulsification process was used to create the cream, and its physicochemical characteristics—such as pH, spreadability, homogeneity, viscosity, stability, and antibacterial activity—were assessed. According to the results, the cream was suited for topical use since it was stable, non-irritating, and effective against skin infections. Excellent aesthetic qualities and the absence of phase separation and microbiological contamination were displayed by the formulation, indicating that it may be used as a natural and safe skincare product.***

Keywords: Turmeric cream, Curcuma longa, herbal formulation, antimicrobial activity, skin care, natural cosmetics, anti-inflammatory, herbal cosmetics.

I. INTRODUCTION

The need for natural and herbal substitutes has increased as a result of increased knowledge of the negative consequences linked to synthetic components in dermatological and cosmetic formulations. Turmeric (Curcuma longa Linn.), one of the many botanicals used in ancient medical systems like Ayurveda, Unani, and Siddha, has attracted particular interest because to its medicinal and aesthetic properties. Because of its anti-inflammatory, anti-aging, anti-microbial, and antioxidant qualities, turmeric—known as "haldi" in India—has long been valued as a culinary spice as well as a potent skin care and wound-healing agent. Therefore, there is a lot of scientific and commercial interest in the cosmeceutical and pharmaceutical fields about the development and assessment of a natural turmeric cream[1-2]. Herbal creams are topical semisolid emulsions containing herbal active ingredients. Because of their simplicity of use, visual appeal, and capacity for localized action, these formulations are typically chosen for their non-invasive drug delivery method. In order to achieve the intended therapeutic benefits without causing systemic adverse effects, a well-formulated herbal cream guarantees improved penetration of the active ingredients through the stratum corneum. The bioactive ingredient curcumin, which is the primary cause of turmeric's pharmacological effects, is used when it is added to cream compositions[3-4].

A. Turmeric as a Medicinal Plant

Turmeric belongs to the family Zingiberaceae and is a perennial herb with rhizomatous roots. The yellow pigment in turmeric, mainly attributed to curcumin, has shown broad-spectrum activities including antiseptic, antibacterial, antifungal, antioxidant, wound healing, and skin lightening properties. Curcumin, chemically known as diferuloylmethane, exhibits potent free radical scavenging abilities and has been found effective in reducing melanin production, promoting collagen synthesis, and improving overall skin texture. In addition to curcumin, turmeric contains other curcuminoids such as demethoxycurcumin and bisdemethoxycurcumin, which contribute to its pharmacological activity[5-6].

Modern research has validated turmeric's effectiveness in treating various dermatological conditions like acne, eczema, psoriasis, premature aging, and hyperpigmentation. Its anti-inflammatory effects are primarily due to the inhibition of enzymes such as cyclooxygenase-2 (COX-2) and lipoxygenase, which are implicated in inflammatory pathways. The antimicrobial effect of turmeric is beneficial in controlling acne-causing bacteria such as Propionibacterium acnes and Staphylococcus aureus. These properties make turmeric an ideal candidate for developing herbal topical formulations such as creams[7-8].

B. Importance of Herbal Cream Formulations

Creams are especially well-liked topical dose formulations for dermatological and cosmetic uses. They fall into one of two categories: water-in-oil (W/O) or oil-in-water (O/W) emulsions, each with unique advantages. While W/O creams are thicker and more suited for dry or sensitive skin, O/W creams are non-greasy, readily washable, and ideal for oily skin and daytime use.

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Because they include natural oils and emollients, herbal creams have two functions: they act as carriers for herbal extracts and as skin conditioners[9]. The stability and effectiveness of the active component in turmeric cream are significantly influenced by the emulsion base. Optimizing the formulation's pH, viscosity, spreadability, and consistency is necessary to improve the cream's efficacy and patient acceptance. Additionally, to preserve the product's herbal qualities, the use of natural stabilizers and preservatives is advised[10].

C. Need for Herbal Alternatives

The need to provide herbal substitutes for synthetic creams is highlighted by the rising incidence of skin conditions and the growing customer desire for natural and environmentally friendly goods. Traditional formulations may include mineral oils, sulphate, parabens, and artificial perfumes, all of which have negative side effects such dermatitis, skin irritation, and long-term toxicity. However, turmeric-based herbal creams are typically safe for long-term use, biocompatible, and biodegradable, so even sensitive skin types can use them. Herbal creams with a turmeric basis also support sustainability and less environmental impact by supporting the "green chemistry" and "clean beauty" initiatives. Additionally, herbal formulations have the potential to provide a synergistic approach to skincare and wellbeing by bridging the gap between traditional medicine and contemporary pharmaceutical technologies[11-12].

D. Objective of the Study

The primary aim of the present study is to formulate and evaluate an herbal cream containing turmeric extract to explore its potential as a topical agent for maintaining healthy skin and treating mild dermatological issues. The objectives of this study include:

1) Extraction of turmeric rhizome using suitable solvents to isolate the active constituents.
2) Formulation of a stable cream base using natural and compatible excipients.
3) Incorporation of turmeric extract into the cream base in different concentrations.
4) Evaluation of the formulated cream for physicochemical properties like pH, viscosity, spreadability, homogeneity, stability, and microbial load.
5) Assessment of biological activity, such as antimicrobial efficacy and antioxidant capacity, using standard methods.
6) Skin irritation studies to confirm the safety and suitability of the cream for topical application[13-14].

E. Scope and Significance

In addition to being important for product creation, the current research has wider ramifications for the cosmetics business, public health, and the standardisation of herbal drugs. Given the rapidly expanding worldwide market for herbal skincare products, creating a potent turmeric cream might offer a natural, affordable, and convenient substitute for manufactured skincare products. Additionally, the pharmaceutical and cosmeceutical sectors can benefit from the successful formulation and standardisation of such goods, which can open the door for clinical studies and ultimate commercialization[15-16].

Additionally, this study will provide light on the difficulties and factors to be taken into account when integrating plant-based active ingredients into stable emulsions, offering insights into the formulation science of herbal creams. In order to meet the present and future demands for natural skincare products, this also promotes interdisciplinary research between Pharmacognosy and pharmaceutics[17-18].

II. LITERATURE SURVEY

1) Sharma et al. (2013) [19]

Conducted a study to evaluate the antimicrobial potential of turmeric extract against *Staphylococcus aureus* and *Escherichia coli*. The results showed significant antibacterial activity, supporting its traditional use in treating wounds and skin infections. The antioxidant properties also suggested its role in protecting the skin from oxidative damage.

2) Heng (2010) [20]

Reviewed the pharmacodynamics of curcumin and its role in dermatology. The review emphasized that curcumin inhibits nuclear factor kappa B (NF-κB), a key player in inflammation and skin aging, thus making it a promising agent in anti-inflammatory creams and anti-aging formulations.

3) Prajapati et al. (2014)[21]

Formulated an herbal cream containing turmeric and aloe vera. The cream was evaluated for antimicrobial activity, stability, and irritation. It showed no skin irritation and possessed broad-spectrum antibacterial activity, proving the efficacy and safety of turmeric-based topical creams.

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4) Patel and Soni (2011)[22]

Worked on the formulation of an oil-in-water emulsion-based cream containing turmeric extract. They observed improved texture, stability, and patient acceptability. The cream maintained its integrity under various storage conditions, making it suitable for long-term use.

5) Kumar et al. (2016) [23]

Investigated the preservative potential of turmeric extract in herbal cosmetics. They concluded that turmeric not only provided therapeutic benefits but also functioned as a natural preservative, extending shelf-life and reducing microbial growth in formulations.

6) Sidhu et al. (2015)[24]

Formulated a topical gel using curcumin and evaluated it for wound healing properties in experimental rats. Their findings confirmed faster wound contraction and epithelialization, thereby justifying the inclusion of turmeric in herbal formulations aimed at healing.

7) Saha and Verma (2017) [25]

Conducted a market-based study analyzing trends in herbal cosmetics. The results highlighted that turmeric-based products are among the most demanded in the Indian and global markets, particularly for their roles in treating acne and enhancing complexion.

8) Desai et al. (2018) [26]

Studied the role of herbal oils in enhancing the penetration of curcumin in topical formulations. It was observed that natural oils such as coconut and sesame oil facilitated better skin penetration and curcumin retention, enhancing therapeutic action.

9) Jain et al. (2012)[27]

Provided guidelines for the evaluation of herbal creams. Their work emphasized the importance of parameters such as pH (preferably 5.5–6.0), spreadability, viscosity, and microbial load. These parameters are critical in the development of effective turmeric creams.

10) Gupta and Meena (2019)[28]

Evaluated the synergistic effects of turmeric when combined with other herbs such as tulsi (*Ocimum sanctum*) and manjistha (*Rubia cordifolia*). The polyherbal formulation showed enhanced antimicrobial activity and better user acceptability compared to single-herb formulations.

III. FORMULATION

A. Material Used: Curcumin

Biological Source:

Curcumin is the principal curcuminoid extracted from the rhizomes of *Curcuma longa* Linn.

Family:

Zingiberaceae (Ginger family)

Chemical Constituents:

The major bioactive constituents of *Curcuma longa* include:

- Curcuminoids (approximately 3–5% of dried rhizome):Curcumin (diferuloylmethane),De methoxy curcumin, Bisdemethoxycurcumin
- Volatile oils (2–7%):Turmerone, Atlantone, Zingiberene
- Other components: Proteins, Resins, Sugars, Polysaccharides (e.g., ukonan A, B, C)

Chemical Formula of Curcumin: $C_{21}H_{20}O_6$

Molecular Weight: 368.39 g/mol

Uses: Pharmaceutical: Anti-inflammatory, Antioxidant, Antibacterial, Anticancer, Wound healing agent

Quantity of Ingredients

Ingredients
curcumin extract
bees wax
borax
methyl paraben
liquid paraffin
rose oil

B. Procedure

1) Curcumin extract preparation

Turmeric powder + ethanol -→Extracted on Hot Plate for 15 min → Filter

2) Oil phase preparation

Bees wax + Liquid Paraffin) → Heat on Water Batch at 75 ^{0}C

3) Aqueous phase preparation

Borax + Methyl Paraffin + Distilled water → Heat on water bath at 75^0 C

4) Add curcumin extract to oil phase at 75 ^{0}C

5) Add aqueous phase into the oil phase in dropwise method

6) Triturate in mortar and pestle to smooth pasty form

7) Add rose oil for fragrance

8) The prepared formulation is evaporated and submitted.

C. Evaluation Parameters

To ensure the safety, stability, and efficacy of the formulated herbal turmeric cream, various physicochemical and biological evaluation parameters must be performed. These tests help in standardizing the formulation and assessing its suitability for dermatological use.

1) Organoleptic Evaluation

- Parameters: Color, odor, appearance, and texture
- Purpose: To ensure aesthetic acceptability and consumer compliance

2) Spreadability

- Method: Parallel plate method
- Importance: Indicates how easily the cream spreads on the skin surface

3) Viscosity

- Instrument: Brookfield viscometer
- Importance: Evaluates the flow property, consistency, and application feel

4) Homogeneity Test

- Observation: Visual inspection under uniform lighting
- Purpose: To confirm uniform distribution of turmeric and other ingredients

5) Wash ability

- Test: Application on skin followed by water rinsing
- Importance: Assesses ease of removal and consumer preference

6) Stability Studies

- Conditions: Accelerated stability at 40°C ± 2°C / 75% RH ± 5% RH for 1-3 months
- Parameters: Change in color, odor, pH, phase separation
- Outcome: Helps predict shelf-life

7) Skin Irritation Test

- Method: Patch test on human volunteers or animal models (under ethical approval)
- Result: Absence of redness, swelling, or itching indicates non-irritant formulation

8) Microbial Load Testing

- Tested for: Total bacterial count, fungal count, and absence of pathogens (E. coli, S. aureus)
- Standards: As per Indian Pharmacopeia or WHO guidelines

9) Antimicrobial Activity

- Method: Agar well diffusion method
- Test Organisms: *Staphylococcus aureus*, *Propionibacterium acnes*
- Result: Zone of inhibition indicates effectiveness of turmeric as antimicrobial agent

IV. FUTURE SCOPE OF STUDY

The herbal turmeric cream has enormous potential for advancement in therapeutic skincare and cosmeceutical products. Future research might concentrate on using Nano formulations to improve the stability and skin penetration of curcumin. To prove its long-term safety and effectiveness, clinical studies are necessary. Turmeric and other herbal active ingredients may work in concert to cure a variety of skin disorders. Furthermore, standardisation via the use of cutting-edge analytical methods and the investigation of environmentally friendly, sustainable packaging can improve market attractiveness. Particularly for organic cosmetics, the mixture has potential for worldwide commercialization. Turmeric cream may prove to be a useful supplement to natural dermatological treatments as consumer demand for herbal goods rises[29-30].

V. CONCLUSION

It was discovered that the herbal turmeric cream formulation was stable, secure, and efficient when used topically. It is a possible substitute for synthetic skin creams due to its advantageous physicochemical properties as well as curcumin's antibacterial and anti-inflammatory properties. Its appropriateness for both therapeutic and cosmetic usage is confirmed by the lack of microbiological contamination and skin irritation. Herbal creams based on turmeric have the potential to become popular and commercialized due to the growing demand for natural skincare products. Its therapeutic usefulness and commercial reach can be increased by more clinical research and the use of cutting-edge delivery methods.

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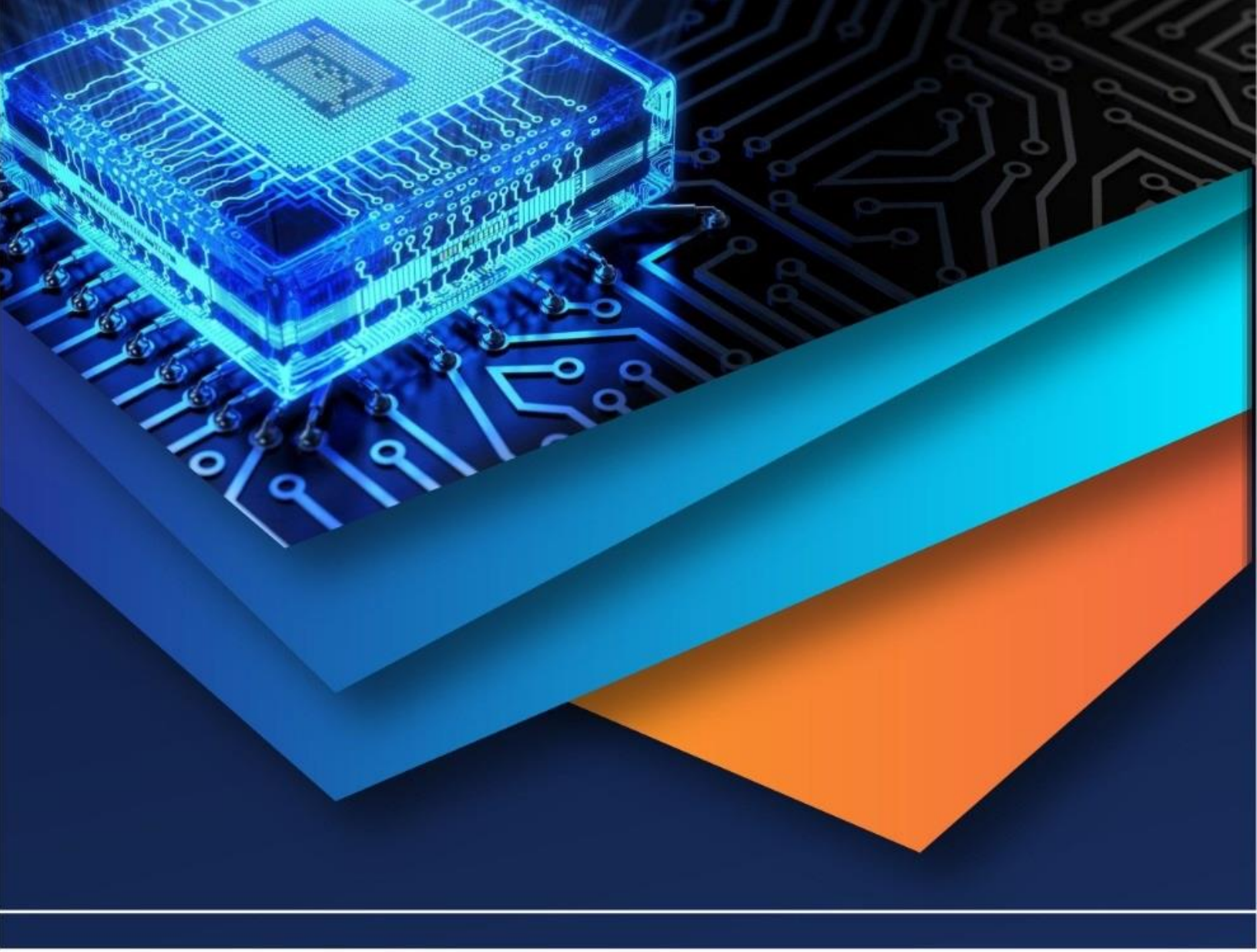

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