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FORMULATION AND EVALUATION OF HERBAL TURMERIC CREAM

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ABSTRACT

The present study focuses on the formulation and evaluation of a herbal turmeric cream containing *Curcuma longa* extract for topical application. Turmeric was selected as the active herbal ingredient because of its well-known anti-inflammatory, antimicrobial, antioxidant, and wound-healing properties attributed mainly to curcumin. The herbal cream was formulated using suitable excipients including stearic acid, cetyl alcohol, liquid paraffin, Carbopol 940, propylene glycol, and natural additives such as beetroot extract and sandalwood. The formulation was prepared by emulsification technique and evaluated for various physicochemical parameters including physical appearance, pH, viscosity, spreadability, washability, homogeneity, and irritancy. The prepared cream exhibited a smooth texture, yellow color, pleasant herbal odor, and non-greasy consistency with good homogeneity. The pH of the formulation was found to be 5.8, which is compatible with normal skin pH. The viscosity was observed to be 20926 cP, indicating suitable consistency for topical application. The spreadability value was satisfactory, demonstrating ease of application and uniform distribution on the skin. The cream also showed good washability and no signs of skin irritation or redness during irritancy testing. The study concluded that the formulated herbal turmeric cream is stable, safe, and effective for topical use.

KEYWORDS: Herbal cream, Curcumin, Turmeric, Topical formulation, Anti-inflammatory activity, Antimicrobial activity, Antioxidant activity.

INTRODUCTION

Herbal cosmetics are beauty and personal-care products made with plant-derived ingredients such as herbs, oils, extracts, and natural dyes, often blended into a cosmetic base to improve skin, hair, or body care. They are also called natural cosmetics, and their concept centers on using botanical materials for cleansing, conditioning, healing, or enhancing appearance.[1]

Herbal cosmetics combine cosmetic ingredients with one or more herbal ingredients so the final product offers both aesthetic and functional benefits. In practice, this includes products like herbal face washes, shampoos, conditioners, soaps, and creams made with plant-based active components. The idea is not just to beautify, but also to use the natural properties of herbs to support skin and hair health.[2]

Global demand for natural and plant-based cosmetics is rising steadily as consumers increasingly prefer cleaner, more transparent ingredient lists and alternatives to conventional chemical-heavy products. Market reports show this segment is expanding strongly, with one estimate valuing the natural cosmetics market at USD 55.4 billion in 2026 and projecting continued growth through 2036. This growth is driven by awareness of sustainability, wellness, and the appeal of plant-based formulations.[3]

Advantages over synthetic products

Herbal cosmetics are often preferred because they are perceived as safer, with fewer side effects and less likelihood of irritation compared with many synthetic products.[4] They are also considered eco-friendly because they rely more on renewable plant materials and are associated with a lower chemical burden in use and disposal. In addition, consumers often value them for their natural nutrient content and compatibility with sensitive skin.[5]

Basic structure and function

The **epidermis** is the outer layer; it provides the first barrier against the environment and contains cells that help with protection and pigmentation. The dermis lies beneath it and contains collagen, elastin, blood vessels, nerves, glands, and hair follicles, giving skin strength, flexibility, sensation, and support for sweat and oil production.[6]

The hypodermis is the deeper layer that connects skin to underlying tissues and stores fat for protection and insulation.[7]

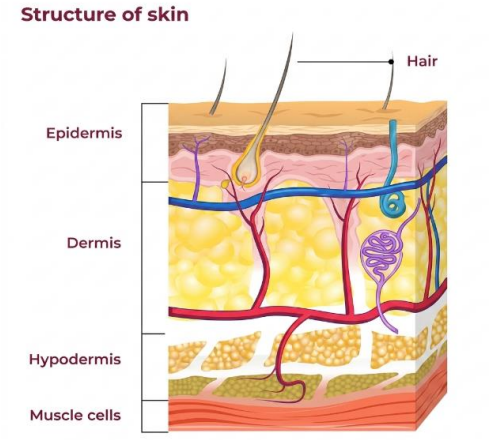

Figure No.1: Structure of skin.

Common skin problems

Acne is a very common inflammatory condition caused by clogged follicles with oil, dead skin cells, and bacteria.

Inflammation can also appear as redness, swelling, itching, or irritation in conditions such as eczema-like skin disorders.[8] Dryness occurs when the skin barrier loses moisture, leading to tightness, flaking, and increased vulnerability to irritation or infection. Skin infections can happen when the barrier is weakened, making it easier for microbes to enter and multiply.[9]

Topical care

Topical preparations are medicines or cosmetic products applied directly to the skin, so they deliver the active ingredient where it is needed.[10] This is important in skin care because it can reduce systemic side effects, improve local action, and make treatment more targeted for conditions like acne, dryness, and inflammation. In everyday skin care, topical products such as creams, lotions, gels, and ointments are widely used to cleanse, moisturize, protect, and treat the skin.[11]

Healthy skin is not just about appearance; it is essential for defense, hydration balance, temperature control, and overall wellness. That is why skin care products and topical treatments play such a central role in both prevention and treatment of common skin problems.[12]

Creams are semi-solid topical dosage forms in which one or more active ingredients are dissolved or dispersed in a suitable base for skin application. They are widely used in dermatology and cosmetics because they are easy to apply, spread well, and are generally well accepted by patients.[13]

Types of creams

- **Oil-in-Water (O/W):** Oil droplets are dispersed in a continuous water phase, so these creams feel lighter, less greasy, and are easier to wash off.
- **Water-in-Oil (W/O):** Water droplets are dispersed in a continuous oil phase, making these creams richer, more occlusive, and better suited for dry skin and barrier protection.[14]

Advantages

Creams are favored because they spread smoothly over the skin and give a pleasant feel during use. Their semi-solid consistency supports localized delivery of the active ingredient, which can improve practical effectiveness in skin care. Better texture and ease of application also contribute to patient compliance, especially for products intended for regular, everyday use.[15]

Herbal ingredients play a major role in topical formulations because they can deliver therapeutic skin benefits while keeping products aligned with the demand for natural, gentle, and multifunctional cosmetics. They are especially valued in dermatology and cosmeceuticals for combining treatment and skin care in one formulation.[16]

Importance in dermatology

Plant-based actives are widely used because many contain bioactive compounds such as polyphenols, flavonoids, terpenoids, alkaloids, and saponins that support skin health. These ingredients are often incorporated into creams, gels,

and lotions for conditions such as acne, irritation, dryness, and minor infections. Their appeal comes from the fact that they can provide targeted topical action with a natural origin.[17]

Herbal ingredients are commonly used for antimicrobial, anti-inflammatory, and antioxidant effects.[18] Antimicrobial activity helps reduce microbial load on the skin, which is useful in acne-prone or infection-prone formulations. Anti-inflammatory and antioxidant actions help soothe irritated skin, reduce redness, and protect against oxidative stress that can contribute to skin damage and premature aging.[19]

Turmeric

Turmeric is the rhizome-based medicinal plant *Curcuma longa*, widely known in India as haldi and used for centuries in Ayurveda. Its main active constituent is curcumin, the principal curcuminoid responsible for many of its biological and cosmetic effects.[20]

Figure No. 2: Turmeric plant and rhizomes.

Botanical identity

Curcuma longa belongs to the ginger family, Zingiberaceae, and is the species commonly referred to as turmeric. The plant is valued both as a spice and as a medicinal herb.[21]

Traditional use in Ayurveda

In Ayurveda, turmeric has long been used internally and externally for a wide range of conditions, and it is especially known for its role in skin care and inflammation-related uses. Traditional preparations include powders, pastes, creams, lotions, and ointments.[22]

Active constituent

Curcumin is the major bioactive compound in turmeric and is considered its most important therapeutic constituent. Turmeric also contains related curcuminoids such as demethoxycurcumin and bisdemethoxycurcumin.[23]

Application

Turmeric is used in medicine for its anti-inflammatory, antimicrobial, and antioxidant potential, which supports its traditional and modern therapeutic applications. In cosmetics, it is included in creams, masks, and other topical products for its skin-soothing, brightening, and protective properties.[24]

i. **Anti-inflammatory activity:** Curcumin, the major bioactive compound in turmeric, suppresses inflammatory signaling pathways and reduces inflammatory mediators such as NF-κB–related pathways and cytokines. This is why turmeric is often studied for inflammatory skin and systemic conditions.[25]
ii. **Antioxidant activity:** Turmeric has strong antioxidant potential and helps neutralize free radicals that contribute to oxidative stress and tissue damage. This antioxidant action supports its use in protecting skin cells and slowing visible signs of damage.[26]
iii. **Antimicrobial effect:** Curcumin and turmeric extracts have shown antibacterial, antifungal, and broader antimicrobial activity against several pathogens. This makes turmeric useful in topical products aimed at reducing microbial load on the skin.[27]
iv. **Wound healing and skin brightening:** Turmeric is widely associated with wound-healing support because its anti-inflammatory, antioxidant, and antimicrobial actions together create a favorable environment for tissue repair. It is also used in cosmetic formulations for skin brightening and improving complexion, largely due to its ability to reduce dullness, inflammation, and oxidative stress.[28]

Why synthetic products are limited

Synthetic skin products often rely on chemical ingredients that may be effective but can also trigger burning, redness, itching, sensitivity, or contact dermatitis in some users. Repeated exposure can be problematic for people with sensitive skin, inflammatory conditions, or damaged skin barriers. This creates demand for gentler alternatives that can still provide visible skin benefits.[29]

Why herbal formulations are preferred

Consumers are increasingly choosing herbal and plant-based products because they are perceived as safer, more natural, and more compatible with long-term use. Herbal formulations also fit current trends in clean beauty, wellness, and eco-friendly skincare. As a result, natural topical products are gaining strong acceptance in both cosmetic and dermatological markets.[30]

Why turmeric

Turmeric is especially suitable because it has a long history of traditional use and is supported by modern evidence for multiple skin benefits. Its curcumin content helps reduce inflammation, oxidative stress, and microbial growth, which is useful in skin problems such as acne, irritation, and minor infections. It also supports wound healing and may improve complexion, making it a practical multifunctional ingredient for a herbal cream.[31]

Formulation value

Using turmeric in a cream allows direct application to the skin with localized action, good spreadability, and user convenience. A well-designed herbal turmeric cream can therefore combine therapeutic potential with cosmetic appeal, making it a logical alternative to harsher synthetic products.[32]

The scope of this study is to develop a stable and effective herbal cream with turmeric as a key active ingredient, aiming to combine cosmetic appeal with therapeutic benefit. Such a formulation is relevant because it can support skin care while offering natural anti-inflammatory, antioxidant, antimicrobial, and wound-supportive properties.[33]

Importance of formulation

A stable herbal cream is important because topical products must maintain their physical consistency, pH, appearance, and efficacy during storage and use. If the formulation is unstable, it may separate, lose activity, or become less acceptable to users. Developing a well-designed cream also helps ensure proper spreadability, skin feel, and delivery of the active ingredient.[34]

METHODOLOGY

Materials

S. No.	Ingredient	Quantity (for 100 g)	Function
1 2	Turmeric extract Propylene glycol	2.0 g 5 g	Anti-inflammatory, antimicrobial, Humectant
3	Beetroot extract	2.0 g	Natural colorant, antioxidant, glow enhancer
4	Sandalwood powder/extract	1.0 g	Cooling agent, fragrance, anti-acne
5	Carbopol 940	0.5 g	Gelling agent, viscosity enhancer
6	Stearic acid	10 g	Emulsifying agent, thickener
7	Cetyl alcohol	2 g	Co-emulsifier, emollient, stabilizer
8	Liquid paraffin	5 g	Emollient, moisturizing agent
9	Methyl paraben	0.18 g	Preservative
10	Propyl paraben	0.02 g	Preservative (synergistic effect)
11	Distilled water	q.s. to 100 g	Vehicle / solvent

Formulation of Herbal Turmeric Cream

1. Preparation of Oil Phase

Sterric acid, Cetyl alcohol, Liquid paraffin were taken in a beaker and heated to 70–75°C under continuous stirring to ensure uniform melting.

2. Preparation of Aqueous Phase

A separate beaker was used to heat distilled water, methyl paraben, propyl paraben to 70–75°C while stirring continuously until the was completely dissolved. preservative were then added to the heated aqueous phase with gentle stirring.

Figure No. 3: Oil phase and aqueous phase in a beaker.

3. Preparation of gel phase

A separate beaker was used to mix Carbopol and distilled water and stirring 1 hour,after propylene glycol was added and mix continuously.

4. Emulsification

The heated aqueous phase was slowly added to the oil phase under continuous stirring at 600–800 RPM to form an emulsion. The mixture was homogenized at 8000–10000 RPM for 5–10 minutes to ensure uniform dispersion of all ingredients.

5. Final Cooling and Storage

The final formulation was allowed to cool to room temperature and then stored in airtight containers under cool and dry conditions for further evaluation.

Figure No. 4: Herbal Turmeric Cream.

Evaluation Test

1. Physical Appearance (Organoleptic Evaluation)

Take a small quantity of cream in a clean glass slide. Observe the following parameters visually

i. Color
ii. Odor
iii. Texture
iv. Consistency
v. Homogeneity

2. pH Determination

Take 1 g of cream. Dissolve it in 10 ml distilled water. Stir well to form dispersion. Measure pH using a digital pH meter. Ideal pH Range: pH: 5.5 – 6.5 (skin-friendly range)

3. Washability Test

Apply small amount of cream on skin. Wash with tap water.

4. Spreadability Test

Take two glass slides. Place 0.5 g cream on one slide. Place another slide on top. Apply 50 g weight for 1 minute. Measure the distance moved by the upper slide.

5. Viscosity Determination

Measure viscosity using Brookfield Viscometer. Use Spindle No. 3 or 4. Set speed at 10 rpm or 12 rpm.

Record viscosity reading in cP (centipoise). Herbal turmeric cream should ideally have a thick-viscous consistency typically ranging between 8,000 and 64,000 cps.

6. Homogeneity Test

Rub a small amount of cream between fingers. Check for: Smoothness Absence of grittiness Uniform texture.

7. Irritancy Test

Apply small amount on forearm skin. Leave for 24 hours. Observe for redness, irritation, swelling.

RESULT

Evaluation Test

1. Physical Appearance (Organoleptic Evaluation)

Parameter	Observation
Color	Yellow
Odor	Characteristic (pleasant herbal)
Appearance	Smooth and creamy
Texture	Non-greasy
Homogeneity	Uniform

2. pH Determination

pH: 5.8 (skin-friendly range)

Figure No. 5: pH measurement of prepared cream.

3. Washability Test

Cream is easily washable.

Figure No. 6: Easy washability.

4. Spreadability Test

Measure the distance moved by the upper slide.

Formula:

$S = (M \times L) / T$

Where:

S = Spreadability

$50 \times 6.5 \div 60 = 5.416$g cm/sec

M = Weight (g)

L = Length moved (cm)

T = Time (sec)

Figure No. 7: Cream applied between 2 glass plates for measurement of spredability.

5. Viscosity Determination

The viscosity of the herbal turmeric cream was found to be 20926 cP, indicating good consistency and suitable viscosity for topical application.

Figure No. 8: Viscosity measurement by Brookefield viscometer.

6. Homogeneity Test

Cream is smooth and homogeneous.

7. Irritancy Test

No irritation or redness observed.

CONCLUSION

The present study successfully demonstrated the formulation and evaluation of a herbal cream containing Curcuma longa extract.[52] The cream was prepared using a suitable emulsification technique and showed desirable characteristics such as smooth texture, good consistency, and non-greasy nature, making it acceptable for topical application.[53]

The evaluation parameters, including pH, viscosity, spreadability, and homogeneity, were found to be within acceptable limits, indicating good quality and stability of the formulation. The pH was compatible with skin physiology, and the formulation exhibited excellent spreadability and ease of application. The absence of irritation during testing confirmed that the cream is safe for use on the skin.[54] Additionally, the presence of turmeric contributes beneficial properties such as antimicrobial, anti-inflammatory, and antioxidant effects, which enhance the therapeutic value of the cream.[55]

In conclusion, the formulated herbal turmeric cream proved to be a stable, safe, and effective topical preparation. It offers a promising natural alternative to synthetic creams and has potential applications in both pharmaceutical and cosmetic fields. Further studies, including clinical evaluation, can be carried out to explore its full therapeutic potential.[56]

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Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this research work.

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