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Review Article

Current Perspectives on Herbal Creams as Topical Dosage Forms

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ABSTRACT

Herbal creams have gained considerable attention as topical dosage forms due to increasing demand for natural, safer, and cost-effective therapeutic alternatives in dermatological and cosmeceutical applications. These semisolid preparations combine bioactive phytoconstituents with suitable pharmaceutical bases to deliver therapeutic agents directly to the skin, minimizing systemic side effects and enhancing patient compliance. The present review provides a comprehensive overview of herbal creams as topical drug delivery systems, highlighting their pharmaceutical basis, formulation strategies, and therapeutic relevance. Emphasis is placed on commonly incorporated medicinal plant extracts, their active constituents, and mechanisms of action in managing inflammatory conditions, microbial infections, wound healing, acne, and skin aging. The review also discusses formulation considerations including selection of excipients, extraction methods, stability challenges, and evaluation parameters reported in the literature. Furthermore, issues related to standardization, quality control, regulatory aspects, and batch-to-batch variability of herbal ingredients are critically analyzed. Recent advancements such as incorporation of nanotechnology, liposomal systems, and novel penetration enhancement techniques aimed at improving bioavailability and stability are also explored. Despite promising therapeutic potential, the need for well-designed clinical studies and harmonized regulatory frameworks remains essential for wider acceptance and commercialization. Overall, herbal creams represent a dynamic and evolving segment of topical drug delivery with significant opportunities for research and innovation.

INTRODUCTION

Topical drug delivery systems have long been utilized to administer therapeutic agents directly to localized regions of the body, offering targeted treatment with reduced systemic side effects and

improved patient compliance. Semi-solid dosage forms such as creams represent one of the most widely accepted vehicles for topical therapy due to their ease of application, aesthetic acceptability, and capability to deliver both hydrophilic and lipophilic compounds effectively [4], [5]. Herbal

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creams, a subclass of topical semisolid formulations, combine traditional botanical knowledge with modern pharmaceutical technologies to exploit the pharmacological virtues of plant-derived bioactive compounds for skin care and therapeutic applications.

The global surge in demand for natural and safer alternatives to conventional synthetic products has accelerated research into herbal topical formulations, particularly herbal creams, owing to their reputed benefits in managing various dermatological conditions and cosmetic needs [2], [3]. Medicinal plants and their phytoconstituents, such as flavonoids, terpenoids, and phenolic compounds, possess a broad spectrum of biological activities including anti-inflammatory, antimicrobial, antioxidant, and wound-healing effects that are conducive to skin health [8]. Despite the rich historical use of plant extracts in skin care, challenges such as standardization, stability, and clinical validation persist, highlighting the need for critical analysis and comprehensive understanding of current formulation strategies and therapeutic outcomes.

In recent years, scientific explorations have focused on optimizing herbal cream formulations through advanced extraction techniques, novel excipients, and improved delivery systems to enhance efficacy and stability while maintaining safety [18]. This review aims to synthesize contemporary research findings, evaluate formulation approaches, and present current trends and future prospects in the development and application of herbal creams as topical dosage forms.

2. Overview of Topical Drug Delivery Systems

1) Definition and Importance

Topical Drug Delivery Systems (TDDS) are pharmaceutical formulations designed to administer therapeutic agents directly onto the skin or mucosal surfaces to achieve local or systemic effects without invasive routes of administration. The topical route is widely preferred due to its non-invasiveness, ease of application, avoidance of first-pass metabolism, improved patient compliance, and reduced systemic side effects compared with conventional oral or injectable therapies.

2) Skin Structure and Barrier Function

The intact skin, especially the stratum corneum, serves as a formidable barrier to penetration. Successful topical drug delivery requires overcoming this barrier via formulation strategies that enhance drug permeation and retention at the target site.

3) Conventional Topical Formulations Conventional TDDS include:

Creams: Oil–water emulsions suitable for moistening and delivering actives to superficial layers.

Gels & Emulgels: Semi-solid, often polymer-based systems offering fast absorption and good spreadability.

Ointments: Greasy bases providing occlusion and prolonged contact. **Pastes & Lotions:** Used for local protective or soothing action.

- **Transdermal Patches:** Adhesive systems that deliver drugs through the skin into systemic circulation over extended periods.

These systems are selected based on drug physicochemical properties, target site, and therapeutic goals.



4) Mechanisms of Drug Release and Penetration

Drug transfer from topical formulations typically involves:

- Diffusion through intercellular lipids in the stratum corneum.
- Transcellular pathways (through corneocytes).
- Appendageal routes (via hair follicles and sweat glands).

Formulation excipients, penetration enhancers, and physical methods are used to improve skin permeation and dermal penetration.

5) Novel and Advanced Topical Systems

To overcome limitations such as poor retention and low bioavailability, advanced systems have been developed, including:

- Nano-emulsions & Nano-emulgels – enhanced solubility and skin penetration.
- Microsponges and vesicular carriers – controlled release at target sites.
- Bio-adhesive polymers – improved adhesion and sustained delivery.
- Microneedles and nanocarriers – enhanced transdermal transport of large molecules. These innovations aim to improve therapeutic efficacy and patient outcomes.

6) Advantages and Challenges Advantages:

- Minimizes first-pass metabolism and systemic adverse effects.

- Allows localized treatment and improved targeting.

- Better patient compliance due to ease of use. Challenges:

- Stratum corneum barrier reduces drug permeation.

- Formulation stability and aesthetic acceptability.

- Variable absorption due to skin condition and site.

3. Herbal Creams: Concept and Pharmaceutical Basis

Herbal creams are classified as semisolid topical dosage forms designed for application on the skin to deliver therapeutic or cosmetic benefits. As emulsions, they typically consist of an oil phase and a water phase, forming either water-in-oil (W/O) or oil-in-water (O/W) systems depending on the intended consistency and application purpose. These emulsions facilitate localized drug delivery to the skin or mucous membranes by dissolving or dispersing active constituents in an appropriate base, improving patient compliance through ease of use and aesthetic appeal [7], [17].

The pharmaceutical basis of herbal creams lies in their ability to combine phytoconstituents with semisolid carriers, allowing natural bioactive compounds extracted from medicinal plants to exert therapeutic effects while minimizing systemic exposure. Plant-derived substances such as flavonoids, terpenoids, and phenolic compounds are incorporated for their anti-inflammatory, antimicrobial, antioxidant, and wound-healing properties, which have been documented in various traditional medicinal systems and supported by modern studies [1], [18]. The choice of herbal ingredients depends on their

known pharmacological profiles and compatibility with the cream base, often guided by traditional knowledge (e.g., Ayurveda, Siddha) and scientific evidence from phytochemical research.

From a pharmaceutical perspective, the formulation of herbal creams also requires careful selection of excipients (emulsifiers, stabilizers, humectants, preservatives) to achieve optimal stability, texture, spreadability, and skin penetration. The emulsification process and quality of excipients significantly influence the absorption and therapeutic performance of the herbal actives. Contemporary reviews highlight that herbal creams not only serve cosmetic needs such as moisturization and skin nourishment but also play therapeutic roles in managing dermatoses, inflammation, and microbial infections, attributed to synergistic interactions between plant extracts and base components [1], [18].

4. Phytoconstituents in Herbal Cream Formulations

Herbal cream formulations leverage the therapeutic potential of bioactive phytochemicals extracted from medicinal plants to enhance skin health and treat various dermatological conditions. These phytoconstituents represent diverse chemical classes—such as flavonoids, terpenoids, phenolic acids, alkaloids, and essential oils—that exhibit a wide range of biological activities relevant to topical application [2], [4].

Flavonoids, a major class of polyphenolic compounds, are commonly incorporated into herbal creams for their antioxidant and anti-inflammatory properties. These compounds scavenge free radicals, protect skin cells from oxidative stress, and modulate inflammatory pathways, making them useful in managing inflammatory skin disorders and aging-related

damage [6], [9]. For example, extracts rich in flavonoids derived from *Calendula officinalis* and *Camellia sinensis* have been evaluated for their skin protective effects in topical preparations [8].

Terpenoids and essential oils—such as those from *Lavandula angustifolia* (lavender) and *Melaleuca alternifolia* (tea tree)—offer antimicrobial and analgesic benefits, enhancing the effectiveness of creams used for acne, bacterial and fungal infections, and minor wounds [3], [12]. The lipophilic nature of many terpenoids also improves their partitioning into the stratum corneum, facilitating enhanced skin penetration.

Phenolic acids (like caffeic and ferulic acid) contribute to antioxidant activity and photoprotection, addressing skin damage from ultraviolet (UV) exposure. These compounds stabilize free radicals and can synergize with other actives to improve formulation efficacy [7], [13]. Additionally, plant sterols and triterpenoids—found in herbs such as *Aloe vera* and *Centella asiatica*—support wound healing and collagen synthesis, further broadening the therapeutic spectrum of herbal creams [10].

Despite their benefits, the incorporation of phytoconstituents requires careful standardization and quality evaluation due to inherent variability in plant sources, extraction conditions, and stability challenges. Hence, current research emphasizes integrating advanced analytical and formulation approaches to maximize bioactivity while ensuring safety and consistency [14].

5. Formulation Approaches Reported in Literature

The successful development of herbal cream formulations necessitates a judicious combination of plant extracts, excipients, and processing techniques to achieve desired stability, therapeutic



performance, and consumer acceptability. Literature studies highlight several key formulation strategies that have been effectively applied to enhance the delivery and effectiveness of herbal actives in cream bases.

1) Selection and Preparation of Herbal Extracts

The initial and critical step in formulation is the extraction and standardization of phytoconstituents from plant materials. Solvent selection (aqueous, hydroalcoholic, or organic) significantly influences extract yield and biological activity. Several researchers have compared different extraction methods such as maceration, Soxhlet extraction, and ultrasonic-assisted extraction to optimize phytochemical content and therapeutic efficacy [2], [6]. Standardization is often performed using chromatographic techniques to ensure consistency in active compound concentrations.

2) Choice of Cream Base

Herbal creams are predominately emulsions that require appropriate selection of bases and emulsifying systems. Oil-in-water (O/W) creams are frequently preferred due to their non-greasy feel and enhanced patient compliance, while water-in-oil (W/O) systems are selected for formulations intended to provide occlusion and longer skin contact [3], [8]. The properties of the base directly influence drug release, skin penetration, and texture. Research indicates that incorporating natural oil phases—such as coconut oil, olive oil, and jojoba oil—not only supports emulsification but also adds intrinsic skin benefits [9].

3) Incorporation of Functional Excipients

Modern herbal cream formulations increasingly employ functional excipients such as penetration enhancers, antioxidants, preservatives, and humectants to improve performance and shelf life. Compounds like propylene glycol, lecithin, glycerin, and certain plant waxes have been studied to enhance both the physical stability of emulsions and penetration of herbal actives through the stratum corneum [11], [12]. Some formulations also include natural preservatives derived from rosemary and grapefruit seed extract to mitigate microbial contamination without synthetic chemicals.

4) Advanced Formulation Techniques

Recent literature has also explored advanced techniques such as nanoemulsion-based herbal creams, where reduced droplet size enhances bioavailability and aesthetic properties. Nano-delivery systems such as solid lipid nanoparticles (SLNs) and nanostructured lipid carriers (NLCs) have shown improved encapsulation of lipophilic herbal actives, increased stability, and controlled release behavior in topical applications [13], [14]. Such advancements illustrate the convergence of traditional herbal knowledge with modern pharmaceutical technology to improve therapeutic outcomes.

Overall, formulation approaches reported in the literature emphasize a holistic integration of botanical science, pharmaceutical excipients, and modern processing methods to develop herbal cream products that are both effective and acceptable to end users.

6. Evaluation and Characterization Methods in Published Studies

Evaluation and characterization of herbal creams are crucial to ensure quality, performance, safety, and therapeutic effectiveness. Published literature



highlights a standardized set of physicochemical, mechanical, *in vitro*, *ex vivo*, and safety assessment techniques that collectively determine the suitability of a semisolid herbal cream for clinical or commercial use.

Physicochemical Evaluation

Physicochemical tests assess basic formulation attributes that influence stability and performance. These include:

- **Appearance and Homogeneity:** Visual inspection under controlled lighting detects phase separation, color change, and consistency uniformity [5].
- **pH Determination:** Maintaining an appropriate pH range (typically 5–7) is essential for skin compatibility and minimizing irritation; measured using calibrated pH meters [6].
- **Viscosity and Rheology:** Viscosity affects spreadability and release of active phytoconstituents; rheological measurements help predict flow behavior under different shear conditions [4], [7].
- **Spreadability and Extrudability:** These parameters quantify ease of application and are routinely measured using standardized mechanical devices or glass plate techniques [5], [9].

Physicochemical characterization provides insight into stability, consistency, and patient acceptability, which is critical for downstream performance evaluations.

Content Uniformity and Active Quantification

Ensuring consistent distribution of herbal actives throughout a cream batch is essential. High-

performance liquid chromatography (HPLC), spectrophotometry, and thin-layer chromatography (TLC) are commonly employed to quantify specific phytoconstituents, verify standardization, and confirm quality [2], [10].

In Vitro and Ex Vivo Release Studies

In vitro release studies using Franz diffusion cells are widely reported to evaluate the release kinetics of active compounds from the cream base into simulated skin or membrane models. These studies indicate the potential release rate and diffusion behavior of phytoconstituents [3], [11]. *Ex vivo* permeation studies using animal or human cadaver skin provide further insight into penetration depth and permeation profiles, informing therapeutic efficiency for localized action.

Microbiological and Stability Studies

Microbial limit tests assess the presence of contaminants, especially in formulations lacking synthetic preservatives. Stability studies under accelerated conditions (e.g., temperature and humidity) reveal potential physical and chemical degradation pathways, guiding shelf-life determination [8], [12].

Safety and Skin Irritation Testing

Dermal safety testing—including patch tests and erythema scoring on human volunteers or animal skin models—plays a significant role in evaluating irritation or sensitization potential of herbal creams [9], [13]. These studies ensure formulations are safe for intended use and help gain regulatory acceptance.

7. Therapeutic Applications Documented in Literature

Herbal creams have demonstrated a wide range of therapeutic benefits in scientific literature. Several



clinical and preclinical studies report their effectiveness in anti-inflammatory, antimicrobial, wound healing, anti-acne/dermatological, and cosmeceutical applications due to the synergistic activity of plant-derived bioactive compounds such as flavonoids, essential oils, and phenolics [9]

1) Anti-Inflammatory Activity

Herbal creams containing extracts such as *Curcuma longa* (turmeric), *Aloe vera*, *Lavandula angustifolia* (lavender), and other botanicals exhibit significant anti-inflammatory effects that help soothe skin irritation and reduce inflammatory biomarkers. These effects are attributed to phytochemicals like curcuminoids and monoterpenes that modulate pro-inflammatory pathways when applied topically, making these creams suitable for managing conditions involving dermal inflammation [2]

2) Antimicrobial Applications

Topical herbal creams have been documented to possess broad-spectrum antimicrobial properties, targeting bacterial and fungal pathogens commonly implicated in skin infections. Phytoconstituents such as essential oils, polyphenols, and flavonoids disrupt microbial cell membranes and inhibit pathogen growth, supporting use in superficial infections and acne [14]

A recent review highlights the antimicrobial and anti-infective potential of herbal creams against a range of microorganisms, noting their therapeutic relevance for dermatological applications, especially where resistance to conventional antibiotics is a concern [9]

3) Wound Healing

Herbal topical creams have shown promising wound-healing effects in both animal and clinical

models. Creams formulated with plant extracts containing collagen-stimulating and antioxidant constituents accelerate tissue repair, fibroblast proliferation, and re-epithelialization. An *in vivo* study comparing creams with and without plant extracts demonstrated significantly improved wound closure rates in treated groups [4]

4) Anti-Acne and Dermatological Uses

Herbal creams formulated for acne management have gained attention due to their antimicrobial, anti-inflammatory and sebum-modulating activities. Traditional medicinal plants such as neem (*Azadirachta indica*), tulsi (*Ocimum sanctum*), and turmeric show potential in reducing acne-associated inflammation and bacterial colonization, although specific cream formulation evaluations continue to emerge in recent literature [30]

5) Cosmeceutical Applications

Beyond clinical therapeutic uses, herbal creams are widely documented for cosmeceutical benefits including skin hydration, antioxidant protection, UV defense, and anti-aging effects. Phytochemical-rich extracts in these creams improve skin appearance, reduce oxidative stress, and support overall skin health, making them increasingly popular in natural skincare products [12]

8. Regulatory and Quality Considerations

Herbal creams, though widely accepted due to their natural origin and topical utility, occupy a complex regulatory space that intersects drug, cosmetic, and traditional medicine categories depending on claimed use and jurisdiction. Quality control and regulatory compliance are essential to ensure the safety, efficacy, and consistency of these products.



Regulatory Classification

Regulatory frameworks vary globally, affecting how herbal creams are evaluated and brought to market. In many regions, herbal topical products are classified either as cosmetics (if only aesthetic claims are made) or medicinal products (if therapeutic claims are asserted). For example, in the United States, the FDA regulates herbal creams as cosmetics unless therapeutic claims are made, in which case they may be treated as OTC drugs, requiring additional safety and efficacy evidence [10]. In the European Union, marketing authorization for herbal medicinal products is governed under Directive 2001/83/EC, with pathways for traditional use registration or well-established use, along with requisite safety and quality data regardless of historical use [7]

Quality Standards and Guidelines

The European Medicines Agency (EMA) provides scientific guidelines specifically addressing the quality of herbal medicinal products and traditional herbal medicinal products. These documents outline the requirements for declaration of herbal substances, specifications, test procedures, and acceptance criteria, emphasizing comprehensive characterization and quality control of both raw materials and finished products [turn0search19]. Similarly, national regulators such as the Therapeutic Goods Administration (TGA) in Australia adopt harmonized international quality guidelines to ensure consistency in product assessment [turn0search18]

On the global front, the World Health Organization (WHO) issues guidelines on good herbal processing practices (GHPP) covering the entire lifecycle from raw material collection to finished product, aligning with Good

Manufacturing Practices (GMP) to support product quality and safety [26]

Quality Assurance and Control

Herbal creams must comply with Good Manufacturing Practices (GMP), involving documented control of raw materials, excipients, manufacturing processes, in-process testing, and finished product evaluation to minimize variability and contamination. Quality control testing includes physical, chemical, microbial, and stability assessments standardized in pharmacopoeial references to ensure product integrity throughout shelf life [turn0search14].

Additionally, semisolid regulatory research highlights the importance of identifying critical quality attributes (CQAs) and performance parameters—such as viscosity, rheology, and bioequivalence—for maintaining consistent therapeutic action, particularly when establishing equivalence for generic formulations [1]

9. Current Challenges in Herbal Cream Development

Despite the promising therapeutic potential of herbal creams, their development and commercialization face a variety of scientific, regulatory, and quality-related challenges. These obstacles arise from intrinsic variability in plant materials, formulation instability, lack of standardized evaluation methods, and inconsistent regulatory frameworks, which collectively complicate product development and market acceptance.

1) Variability and Standardization of Herbal Raw Materials

One of the most significant challenges in herbal cream development is the inherent variability of plant materials. Factors such as geographic origin,



harvest time, soil composition, and extraction methods result in fluctuating concentrations of active phytoconstituents, making batch-to-batch consistency difficult to maintain. Accurate standardization of herbal extracts is essential for reproducible therapeutic outcomes, yet this remains a persistent challenge due to the complex chemical profile of botanical ingredients [1][3].

2) Stability and Physicochemical Challenges

Herbal creams often incorporate thermo-labile and chemically unstable phytocompounds, which can degrade during manufacturing and storage. Variables such as temperature, light exposure, and pH affect the stability of both active constituents and the emulsion base.

Therefore, ensuring long-term stability while retaining bioactivity represents a major formulation challenge [4]

- Stability studies often highlight phase separation, color changes, and loss of active potency in herbal formulations over time [4]

3) Lack of Standardized Evaluation Protocols

While pharmaceutical semisolid dosage forms have established evaluation methods (e.g., viscosity, spreadability, in vitro release), there is a lack of harmonized and herbal-specific evaluation guidelines that encompass the multifaceted nature of plant bioactives. Limited standard protocols for in vitro release, skin permeation, and bioactivity assessments create inconsistencies across studies and complicate comparative analysis [5]

4) Regulatory and Documentation Burden

Herbal creams often fall into ambiguous regulatory categories — cosmetic, traditional medicine, or drug — depending on jurisdiction and claimed use. Due to this, developers face

inconsistent regulatory expectations for safety, efficacy, and quality documentation. This regulatory ambiguity may delay product approvals and limit market access [6]

5) Safety and Toxicity Concerns

Although herbal products are often perceived as inherently safe, some phytochemicals may cause contact dermatitis, sensitization, or allergic reactions in susceptible individuals. Patch tests and clinical safety evaluations are necessary but often limited in literature, leading to incomplete safety profiles for certain herbal creams [7]

6) Limited Clinical Evidence

Most published work on herbal creams relies on in vitro or animal models, with relatively fewer controlled human clinical trials. The scarcity of rigorous clinical data makes it difficult to validate therapeutic claims and support evidence-based recommendations for specific conditions [8]

10. Emerging Trends and Future Perspectives

The field of herbal topical dosage forms, particularly herbal creams, is experiencing significant evolution driven by scientific innovation and consumer demand for natural, effective, and safer products. Emerging trends focus on integrating advanced drug delivery technologies, improving bioavailability and therapeutic efficacy, embracing sustainability, and expanding clinical and regulatory frameworks.

1) Nanotechnology-Enhanced Herbal Formulations

One of the most notable trends is the application of nanotechnology and nano-based delivery systems to overcome the limitations of conventional herbal creams, such as poor bioavailability and penetration through the skin

barrier. Recent evidence suggests that nanoscale carriers such as nanostructured lipid carriers (NLCs), solid lipid nanoparticles (SLNs), ethosomes, and liposomes can facilitate deeper skin penetration, controlled release of actives, and enhanced therapeutic outcomes for anti-inflammatory and wound healing purposes [turn0search10]

The integration of nanotechnology with herbal actives is shown to increase bioavailability and reduce dosage requirements while maintaining a biocompatible “green” profile, paving the way for more effective and versatile topical products [turn0search10]

2) Advanced Vesicular and Carrier Systems

Beyond basic nanocarriers, novel vesicular systems such as transferosomes and invasomes are gaining attention. These systems can more effectively navigate the stratum corneum—the skin’s primary barrier—to deliver herbal actives with improved efficacy and reduced irritation compared to conventional creams. Such approaches are expected to become more mainstream as formulation science advances [30]

3) Personalized and Tailored Herbal Topicals

With advancements in biotechnology and computational modeling, there is growing potential for personalized herbal cream formulations tailored to individual skin types, conditions, and preferences. Emerging research combining artificial intelligence (AI) with herbal formulation development suggests future approaches may leverage data to optimize extract combinations, dosage levels, and delivery mechanisms for individualized therapy [15]

4) Bioactive Cosmeceuticals and Functional Ingredients

The cosmeceutical segment continues to expand, with herbal creams being developed not only for therapeutic use but also for anti-aging, antioxidant protection, hydration enhancement, and photoprotection. Polyphenol-rich botanical extracts, such as flavonoids and carotenoids, are central to this trend, offering multifunctional benefits that blur the line between medicinal and cosmetic applications [1]

5) Sustainability and Green Formulation Practices

Future trends also emphasize eco-friendly and sustainable production, including the use of biodegradable excipients, green extraction methods, and ethically sourced botanicals. Such practices align with consumer demand for environmentally responsible products and are expected to influence both research focus and commercial development in herbal cream formulations [1]

CONCLUSION

Herbal creams have emerged as promising topical dosage forms that integrate traditional phytotherapy with modern pharmaceutical formulation science. The available literature demonstrates that these semisolid systems possess significant therapeutic potential, particularly in anti-inflammatory, antimicrobial, wound healing, and cosmeceutical applications, largely due to the synergistic activity of plant-derived bioactive compounds such as flavonoids, terpenoids, alkaloids, and polyphenols [1], [2]. Their increasing acceptance is driven not only by consumer preference for natural products but also by growing scientific validation of their pharmacological efficacy.

However, despite these advantages, the development of herbal creams remains challenged



by issues related to standardization of plant materials, physicochemical instability, regulatory variability, limited clinical evidence, and quality assurance complexities [3], [4]. Ensuring batch-to-batch consistency, establishing critical quality attributes, and implementing harmonized evaluation protocols are essential steps toward improving product reliability and global acceptance.

Emerging technologies, particularly nanotechnology-based delivery systems and advanced vesicular carriers, are offering innovative solutions to enhance skin penetration, stability, and controlled release of herbal actives [5]. Furthermore, the integration of sustainable extraction methods and evidence-based research approaches is expected to strengthen the scientific foundation of herbal topical therapies.

In conclusion, herbal creams represent a dynamic and evolving area within topical drug delivery systems. While significant progress has been made in formulation and therapeutic validation, future research must emphasize rigorous clinical trials, regulatory harmonization, advanced delivery technologies, and comprehensive quality control strategies. Such efforts will ensure that herbal creams transition from traditional remedies to scientifically robust, globally accepted therapeutic dosage forms.

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