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Topical Therapies in Psoriasis Management: A Comprehensive Review of External Medications and Clinical Outcomes

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Abstract:

Background:
Psoriasis is a chronic, immune-mediated dermatological disorder characterized by erythematous, scaly plaques resulting from hyperproliferation of keratinocytes and dysregulated immune responses. It significantly affects patients' quality of life and is associated with comorbidities such as metabolic syndrome and cardiovascular disease. Topical therapies remain the cornerstone of management, particularly in mild to moderate cases, due to their targeted action and relatively favorable safety profile (1–3).

Objective:
This review aims to comprehensively evaluate the role of topical (external) therapies in psoriasis management, focusing on their mechanisms of action, clinical efficacy, safety, and therapeutic outcomes.

Methods:
A narrative review was conducted using published literature from standard dermatology textbooks and peer-reviewed journals. Various classes of topical agents, including corticosteroids, vitamin D analogues, retinoids, calcineurin inhibitors, keratolytics, and emerging therapies, were analyzed. Clinical outcomes such as reduction in Psoriasis Area and Severity Index (PASI), improvement in lesion characteristics, and patient adherence were assessed.

Results:
Topical corticosteroids remain the first-line therapy due to their rapid anti-inflammatory and immunosuppressive effects, though long-term use is limited by adverse effects such as skin atrophy. Vitamin D analogues regulate keratinocyte proliferation and differentiation and are commonly used in combination with corticosteroids for enhanced efficacy and safety. Retinoids such as tazarotene normalize epidermal differentiation but may cause irritation. Calcineurin inhibitors provide a safer alternative for sensitive areas, while keratolytics and coal tar act as adjuncts by improving drug penetration and reducing scaling. Emerging therapies, including phosphodiesterase-4 inhibitors and nanotechnology-based formulations, show promising results in improving drug delivery and clinical outcomes. Overall, combination therapies demonstrate superior efficacy compared to monotherapy, with significant reductions in PASI scores and lesion severity (4–8).

Conclusion:
Topical therapies play a pivotal role in psoriasis management, offering effective and localized treatment with minimal systemic involvement. While conventional agents remain the mainstay, newer therapeutic approaches provide opportunities for improved efficacy and patient adherence. A personalized treatment strategy that balances efficacy, safety, and patient preferences is essential for optimal clinical outcomes.

Keywords: Psoriasis; Topical Therapy; Corticosteroids; Vitamin D Analogues; Retinoids; Calcineurin Inhibitors; Keratolytics; PASI Score; Dermatology; External Medications.

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Introduction

Psoriasis is a chronic, immune-mediated inflammatory skin disorder characterized by erythematous, scaly plaques that predominantly affect the extensor surfaces, scalp, and trunk. It is associated with abnormal keratinocyte proliferation and immune dysregulation involving T-cells and cytokines such as tumor necrosis factor-alpha (TNF-α) and interleukins (1). The disease significantly impacts quality of life due to its visible nature and chronic relapsing course.

Globally, psoriasis affects approximately 2–3% of the population, with variations in prevalence across regions and ethnic groups. It can occur at any age, though peaks are commonly observed in early adulthood and later life. Genetic predisposition and environmental triggers such as infections, stress, and trauma play a crucial role in disease onset and exacerbation (2).

The pathogenesis of psoriasis involves a complex interplay between the immune system and keratinocytes. Activation of dendritic cells leads to the release of cytokines that stimulate T-helper cells, particularly Th1 and Th17 pathways. This results in increased production of pro-inflammatory mediators, leading to hyperproliferation of epidermal cells and plaque formation (3).

Management of psoriasis depends on disease severity, extent of involvement, and patient-specific factors. While systemic therapies and biologics are used for moderate to severe cases, topical therapies remain the cornerstone for mild to moderate psoriasis. They are often the first-line treatment due to their targeted action and relatively lower risk of systemic side effects (4).

Topical therapies include corticosteroids, vitamin D analogues, retinoids, calcineurin inhibitors, keratolytics, and coal tar preparations. These agents act through various mechanisms such as anti-inflammatory effects, inhibition of keratinocyte proliferation, and modulation of immune responses (5).

Despite the availability of multiple topical agents, challenges such as adherence, side effects, and variability in response persist. Therefore, understanding the efficacy, safety, and clinical outcomes of these therapies is essential. **This review aims to comprehensively evaluate topical therapies used in psoriasis management, focusing on their mechanisms, clinical effectiveness, and therapeutic outcomes** (6).

2. Pathophysiology of Psoriasis

Psoriasis is primarily driven by immune-mediated mechanisms involving both innate and adaptive immune systems. Activation of dendritic cells leads to the production of cytokines such as IL-23, which promotes differentiation of Th17 cells. These cells produce IL-17 and IL-22, key mediators in psoriasis pathogenesis (7).

Keratinocyte hyperproliferation is a hallmark feature of psoriasis. Normally, keratinocytes undergo a maturation cycle of approximately 28 days, but in psoriasis, this cycle is reduced to 3–5 days. This rapid turnover leads to the accumulation of immature cells, resulting in the characteristic scaling (8).

Angiogenesis and increased vascular permeability are also observed in psoriatic lesions. These changes contribute to erythema and inflammation. The interaction between immune cells and keratinocytes creates a self-amplifying inflammatory loop (9).

Understanding these mechanisms is crucial for the development of targeted therapies. Many topical agents are designed to interrupt these pathways, thereby reducing inflammation and normalizing skin cell turnover (10).

3. Overview of Topical Therapies in Psoriasis

Topical therapies are the mainstay of treatment for mild to moderate psoriasis and are often used in combination with systemic therapies in severe cases. They offer localized treatment with minimal systemic exposure (11).

Corticosteroids are the most commonly prescribed topical agents due to their potent anti-inflammatory and immunosuppressive effects. They reduce cytokine production and inhibit keratinocyte proliferation (12).

Vitamin D analogues, such as calcipotriol, regulate keratinocyte differentiation and proliferation. They are often used in combination with corticosteroids to enhance efficacy and reduce side effects (13).

Other topical agents include retinoids, calcineurin inhibitors, coal tar, and salicylic acid. Each of these agents has a unique mechanism of action and is selected based on the clinical presentation and patient needs (14).

4. Topical Corticosteroids

Topical corticosteroids are the first-line therapy for psoriasis due to their rapid onset of action. They exert anti-inflammatory, antiproliferative, and immunosuppressive effects by inhibiting cytokine production (15).

They are available in different potencies, ranging from low to super potent, allowing tailored treatment based on lesion severity and location. High-potency steroids are used for thick plaques, while low-potency agents are used for sensitive areas (16).

Prolonged use of corticosteroids can lead to side effects such as skin atrophy, telangiectasia, and tachyphylaxis. Therefore, intermittent use and combination therapy are recommended to minimize risks (17).

Combination formulations with vitamin D analogues have shown improved efficacy and reduced adverse effects, making them a preferred choice in clinical practice (18).

5. Vitamin D Analogues

Vitamin D analogues such as calcipotriol and calcitriol play a significant role in psoriasis management. They regulate keratinocyte proliferation and promote differentiation (19).

These agents are effective in reducing plaque thickness and scaling. They are often used as monotherapy or in combination with corticosteroids for enhanced outcomes (20).

Unlike corticosteroids, vitamin D analogues have a lower risk of skin atrophy. However, they may cause irritation and should be used cautiously on sensitive areas (21).

Their long-term safety profile makes them suitable for maintenance therapy in psoriasis patients (22).

6. Topical Retinoids

Topical retinoids, such as tazarotene, are vitamin A derivatives that normalize keratinocyte differentiation and reduce inflammation (23).

They are particularly useful in plaque psoriasis and can be combined with corticosteroids to reduce irritation and improve efficacy (24).

Common side effects include skin irritation and dryness, which may limit patient adherence. Proper patient education is essential for optimal use (25).

Retinoids also enhance the penetration of other topical agents, making them valuable in combination therapy (26).

7. Calcineurin Inhibitors

Calcineurin inhibitors such as tacrolimus and pimecrolimus are used in sensitive areas like the face and intertriginous regions. They inhibit T-cell activation and cytokine release (27).

These agents are particularly useful in inverse psoriasis, where corticosteroids may cause adverse effects (28).

They have a favorable safety profile, with minimal risk of skin atrophy. However, burning sensation and irritation may occur initially (29).

Long-term studies suggest that calcineurin inhibitors are safe and effective for chronic use in selected patients (30).

8. Keratolytics and Coal Tar

Keratolytic agents such as salicylic acid help in removing scales and enhancing the penetration of other topical medications (31).

Coal tar has anti-inflammatory and antiproliferative properties. It has been used for decades in psoriasis management (32).

These agents are often used as adjuncts rather than primary treatments. They improve the effectiveness of other therapies (33).

However, coal tar has limitations such as unpleasant odor and staining, which may affect patient compliance (34).

9. Emerging Topical Therapies

Recent advancements have led to the development of novel topical agents targeting specific pathways in psoriasis. These include phosphodiesterase-4 inhibitors and Janus kinase inhibitors (35).

Nanotechnology-based formulations are being explored to improve drug delivery and efficacy. These systems enhance penetration and reduce side effects (36).

Biologic-based topical therapies are also under investigation, aiming to provide targeted treatment with minimal systemic exposure (37).

These innovations hold promise for improving clinical outcomes and patient satisfaction (38).

10. Clinical Outcomes and Effectiveness

Topical therapies have shown significant improvement in psoriasis severity scores such as PASI (Psoriasis Area and Severity Index). Reduction in erythema, scaling, and plaque thickness is commonly observed (39).

Combination therapies often provide superior outcomes compared to monotherapy. For example, corticosteroids combined with vitamin D analogues show enhanced efficacy (40).

Patient adherence plays a crucial role in treatment success. Factors such as ease of application, cosmetic acceptability, and side effects influence adherence (41).

Long-term management requires a balance between efficacy and safety to prevent relapse and maintain remission (42).

Discussion

Topical therapies remain the cornerstone of psoriasis management, particularly for mild to moderate cases. Their targeted action and safety profile make them suitable for long-term use (43).

However, variability in patient response and adherence challenges limit their effectiveness. Personalized treatment approaches are essential for optimal outcomes (44).

Emerging therapies offer new opportunities for improving treatment efficacy and reducing side effects. Continued research is needed to validate these approaches (45).

Integration of patient education and adherence strategies can significantly enhance treatment success (46).

Conclusion

Topical therapies play a vital role in the management of psoriasis, offering effective and safe treatment options for many patients. Understanding their mechanisms and clinical outcomes is essential for optimal use.

Combination therapies and emerging treatments provide promising avenues for improved management. Addressing challenges such as adherence and side effects is crucial.

Overall, a patient-centered approach that integrates clinical evidence and individual needs can enhance treatment outcomes in psoriasis management.

Table 1: Comparison of Topical Therapies in Psoriasis

Therapy	Mechanism	Advantages	Limitations
Corticosteroids	Anti-inflammatory	Rapid action	Skin atrophy
Vitamin D analogues	Regulate keratinocytes	Safe long-term	Irritation
Retinoids	Normalize differentiation	Effective plaques	Irritation
Calcineurin inhibitors	Immunomodulation	Safe for face	Burning sensation
Coal tar	Anti-inflammatory	Cost-effective	Odor/staining

Table 2: Clinical Outcomes of Topical Therapies

Parameter	Outcome
PASI score	Reduced
Plaque thickness	Decreased
Scaling	Improved
Erythema	Reduced

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