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CLINICAL COURSE AND PREVENTION OF ATOPIC DERMATITIS IN CHILDREN

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ABSTRACT

Atopic dermatitis is a chronic, relapsing inflammatory skin disease that frequently begins in infancy or early childhood and may significantly affect the quality of life of children and their families. This thesis reviews the age-related clinical course of atopic dermatitis, including typical localization of skin lesions, pruritus, xerosis, recurrent exacerbations, and possible infectious and allergic complications. Particular attention is given to the role of epidermal barrier dysfunction, environmental factors, and associated atopic conditions in disease progression. The paper also discusses modern preventive strategies, including regular skin care, moisturizer use, avoidance of individual irritants, early treatment of inflammatory flares, prevention of secondary infections, and caregiver education. Current evidence indicates that successful disease control requires an individualized and comprehensive approach based on long-term skin barrier maintenance and evidence-based anti-inflammatory therapy.

Keywords: atopic dermatitis, children, clinical course, prevention, skin barrier, pruritus, eczema, moisturizers, pediatric dermatology.

INTRODUCTION

Atopic dermatitis (AD), also known as atopic eczema, is a chronic, relapsing inflammatory skin disease characterized by intense pruritus, xerosis, recurrent eczematous lesions, and impairment of the epidermal barrier. It is one of the most common inflammatory skin disorders in childhood and often begins during infancy or early childhood. The disease has a considerable impact not only on the physical health of affected children but also on sleep, emotional well-being, school performance, and the quality of life of their families [1].The global burden of pediatric atopic dermatitis remains substantial. A recent systematic analysis based on Global Burden of Disease 2021 data estimated that approximately 72.4 million children aged 0–14 years were affected by atopic dermatitis worldwide in 2021. The prevalence varies considerably between geographical regions and age groups, reflecting differences in genetic susceptibility, environmental exposure, lifestyle, socioeconomic conditions, and healthcare accessibility [1]. These findings emphasize the importance of effective prevention, early recognition, and appropriate long-term management of the disease.

The pathogenesis of atopic dermatitis is complex and involves interactions between genetic predisposition, epidermal barrier dysfunction, immune dysregulation, skin microbiome alterations, and environmental factors. Defects in structural proteins and lipids of the epidermal barrier increase transepidermal water loss and facilitate the penetration of irritants, allergens, and microorganisms. At the same time, dysregulation of immune responses, particularly type 2 inflammatory pathways, contributes to persistent inflammation and pruritus. These mechanisms create an itch–scratch cycle in which scratching further damages the skin barrier and intensifies inflammation.The clinical course of atopic dermatitis in children is typically chronic and relapsing, with alternating periods of exacerbation and remission. The morphology and distribution of lesions may change with age. In infants, lesions commonly involve the cheeks, scalp, trunk, and extensor surfaces of the extremities. In older children, flexural areas such as the antecubital and popliteal fossae are frequently affected.

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Chronic disease may result in lichenification, excoriations, fissures, pigmentary changes, and increased susceptibility to secondary bacterial or viral infections.

Pruritus is the hallmark symptom of atopic dermatitis and may be particularly severe at night. Persistent itching can disrupt sleep, reduce attention and academic performance, increase irritability, and negatively influence psychosocial development. Moderate-to-severe disease may therefore impose a considerable burden on both the child and caregivers. Early control of inflammation and restoration of the skin barrier are important for reducing the frequency and intensity of exacerbations [2].Atopic dermatitis is also frequently associated with other atopic disorders. Some affected children subsequently develop food allergy, allergic rhinitis, or bronchial asthma, a sequence traditionally referred to as the “atopic march.” However, the progression of atopic disease is heterogeneous, and not every child with atopic dermatitis develops additional allergic disorders. Current pediatric guidelines therefore emphasize assessment of associated conditions according to individual symptoms and risk factors rather than assuming uniform disease progression [3].

Prevention of atopic dermatitis has become an important area of pediatric and dermatological research. Because epidermal barrier dysfunction can occur early in life, considerable attention has been directed toward skin-care interventions during infancy. Current recommendations support appropriate moisturizing skin care as an important component of maintaining epidermal barrier function, although evidence regarding its ability to prevent the initial development of atopic dermatitis remains variable [3, 4]. A large long-term randomized trial found that routine daily emollient use during the first year of life in high-risk infants did not significantly prevent atopic dermatitis by five years of age, demonstrating that prevention is more complex than skin moisturization alone [4].Recent pediatric guidelines indicate that many proposed preventive measures, including specific dietary interventions, routine probiotic or vitamin supplementation, water softening, and environmental allergen avoidance, do not currently have sufficient evidence to be universally recommended for the primary prevention of atopic dermatitis [3]. Therefore, preventive strategies should be evidence-based and should avoid unnecessary dietary restrictions or interventions that may create additional health risks.

For children who have already developed atopic dermatitis, secondary prevention is focused on reducing exacerbations and maintaining disease control. Regular use of moisturizers, avoidance of individual irritants and triggers, appropriate bathing and skin-care practices, early recognition of flares, and timely use of anti-inflammatory therapy are fundamental components of long-term management. Current evidence-based pediatric recommendations strongly support moisturizers, topical corticosteroids, and topical calcineurin inhibitors as important components of treatment, while newer topical and systemic therapies are available for selected children with moderate-to-severe disease [2].Education of parents and caregivers is another essential component of prevention and long-term disease control. Families should understand the chronic relapsing nature of atopic dermatitis, appropriate application of moisturizers and prescribed medications, identification of signs of secondary infection, and the importance of treatment adherence. An individualized approach can reduce disease severity, improve quality of life, and minimize unnecessary restrictions in the child's daily activities.

Thus, atopic dermatitis in children represents a multifactorial chronic disease requiring comprehensive clinical assessment and long-term preventive management. Understanding the age-related clinical course of the disease, maintaining epidermal barrier function, controlling inflammation, identifying relevant triggers, and educating caregivers are central to successful management. The aim of this study is to analyze the clinical course of atopic dermatitis in children and to evaluate contemporary evidence-based approaches to the prevention of disease onset, exacerbations, and associated complications.

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MAIN PART

Clinical Course of Atopic Dermatitis in Children

Atopic dermatitis is characterized by a chronic and relapsing clinical course. The manifestations of the disease vary considerably according to age, disease severity, genetic background, environmental exposure, and associated atopic conditions. Periods of relative remission are frequently interrupted by exacerbations triggered by irritants, infections, climatic changes, sweating, psychological stress, or inappropriate skin care. Pruritus remains the dominant symptom at all ages and is frequently responsible for sleep disturbance, scratching, excoriation, and further impairment of the epidermal barrier [2].The morphology and anatomical distribution of atopic dermatitis change as the child grows. In infancy, the disease often begins during the first months of life. Acute erythematous, papular, or exudative lesions are typically found on the cheeks, forehead, scalp, trunk, and extensor surfaces of the extremities. The diaper area is often relatively spared.

In preschool and school-aged children, lesions become more chronic and are frequently concentrated in flexural areas, particularly the antecubital and popliteal fossae, wrists, ankles, neck, and hands. Repeated scratching may result in lichenification, increased skin markings, excoriations, and pigmentary changes. In adolescents, flexural dermatitis may persist, while involvement of the face, eyelids, neck, hands, and upper trunk can become more prominent.

Table 1. Age-Related Clinical Features of Atopic Dermatitis

Age group	Common localization	Typical clinical features
Infants	Cheeks, scalp, trunk, extensor surfaces	Erythema, papules, vesicles, exudation, crusting, intense itching
Preschool children	Flexural areas, wrists, ankles, neck	Dry skin, erythema, excoriation, recurrent inflammatory lesions
School-aged children	Antecubital and popliteal fossae, hands, neck	Chronic dryness, lichenification, fissures, scratching
Adolescents	Flexures, face, eyelids, neck, hands	Lichenified plaques, chronic eczema, hand dermatitis, pigmentary changes

Assessment of Disease Severity

Clinical assessment should include the extent and intensity of skin lesions, severity of pruritus, frequency of flares, sleep disturbance, response to previous treatment, secondary infection, and impact on daily life. Disease burden cannot always be estimated from the appearance of the skin alone because even limited lesions may cause severe itching and substantial sleep impairment.Several standardized instruments are used in clinical research and specialized practice. The Eczema Area and Severity Index (EASI) evaluates the extent and clinical severity of eczema, while the SCORing Atopic Dermatitis (SCORAD) system incorporates clinical signs, affected body surface area, and subjective symptoms. Patient- or caregiver-reported tools such as the Patient-Oriented Eczema Measure (POEM) are useful for assessing symptom frequency and the impact of disease over time.

Atopic dermatitis can generally be classified clinically as mild, moderate, or severe. Mild disease is usually associated with limited areas of dry or inflamed skin and relatively minor effects on sleep and daily activity. Moderate disease is characterized by more frequent inflammatory lesions, increased pruritus, and recurrent exacerbations. Severe disease may involve extensive inflammation, persistent itching, marked sleep disturbance, recurrent infection, and significant impairment of the child's and family's quality of life [2].

Skin Barrier Dysfunction and the Itch–Scratch Cycle

One of the central mechanisms in atopic dermatitis is disruption of the epidermal barrier. Structural abnormalities in the stratum corneum increase transepidermal water loss and reduce the

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skin's ability to protect against irritants, allergens, and microorganisms. These changes contribute to xerosis and facilitate inflammatory responses.Pruritus initiates scratching, which causes additional mechanical damage to the already impaired epidermal barrier. Barrier damage increases inflammation, and increased inflammation generates further itching. This sequence creates the characteristic **itch–scratch cycle** of atopic dermatitis.Breaking this cycle is therefore an important objective of long-term management. Regular skin hydration, reduction of inflammation, avoidance of relevant irritants, and appropriate treatment of exacerbations can help restore epidermal barrier function and reduce scratching [2].

Skin Microbiome and Infectious Complications

Children with atopic dermatitis have an increased risk of cutaneous infection because of epidermal barrier dysfunction, immune dysregulation, and changes in the skin microbiome. Staphylococcus aureus colonization is particularly common and is associated with worsening skin inflammation and disease severity [5].Secondary bacterial infection should be suspected when lesions develop increased erythema, tenderness, purulent discharge, pustules, or characteristic yellowish crusts. Staphylococcus aureus and Streptococcus pyogenes are among the most frequently implicated bacterial pathogens [6].

Viral infections may also cause clinically important complications. Eczema herpeticum, caused by herpes simplex virus, is an important potentially serious complication characterized by rapidly developing painful monomorphic vesicles, erosions, or punched-out lesions, sometimes accompanied by fever and systemic symptoms. Early recognition is essential because extensive disease can require urgent systemic antiviral therapy [5].

Fungal infections and other microbial complications may also occur, although they are less characteristic than bacterial infections.

Associated Atopic and Non-Atopic Conditions

Atopic dermatitis frequently occurs together with other allergic diseases. Children with AD, particularly those with early-onset or severe disease, may have an increased risk of food allergy, allergic rhinitis, and asthma. This relationship has traditionally been described as the “atopic march,” although current evidence indicates that disease trajectories vary substantially between individual children [3].The impaired epidermal barrier may facilitate cutaneous sensitization to environmental and food allergens. However, broad allergy testing or routine food restriction is not appropriate for every child with atopic dermatitis. Unnecessary elimination diets may lead to nutritional deficiencies and impaired growth. Allergy assessment should therefore be individualized according to the child's clinical history and suspected immediate allergic reactions.Atopic dermatitis may also have psychological and behavioral consequences. Persistent pruritus and sleep disturbance may contribute to irritability, reduced concentration, emotional distress, and impaired quality of life. Current pediatric guidelines emphasize awareness of associated physical and psychosocial comorbidities when evaluating children with persistent or severe disease [3].

Principles of Treatment and Secondary Prevention

The primary goals of management are to restore the epidermal barrier, suppress inflammation, relieve pruritus, prevent exacerbations and infections, and improve the quality of life of the child and family.

1. Regular Use of Moisturizers

Moisturizers are a fundamental component of treatment for children with established atopic dermatitis. Regular application helps increase skin hydration, reduce transepidermal water loss, and improve barrier function. Current pediatric guidelines strongly recommend moisturizers as part of AD management [2].Different formulations are available, including lotions, creams, gels, and ointments. The BEE randomized controlled trial comparing commonly used emollient formulations

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in children found no clear evidence that one major formulation type was universally superior to the others in controlling eczema symptoms [7]. Consequently, selection should consider tolerability, child and caregiver preference, climate, skin condition, ease of application, and adherence.It is important to distinguish **treatment of established disease** from **primary prevention**. Although moisturizers are beneficial for children who already have atopic dermatitis, routine daily emollient use from birth has not consistently been shown to prevent the development of AD. The BEEP randomized trial found no significant preventive effect of daily emollient application during the first year of life in infants at increased familial risk [4].

2. Topical Anti-Inflammatory Therapy

Topical corticosteroids remain a major component of treatment for inflammatory exacerbations. Appropriate potency should be selected according to disease severity, anatomical location, and age. Sensitive sites such as the face and skin folds generally require particular caution.Topical calcineurin inhibitors are steroid-sparing anti-inflammatory treatments that can be useful for selected children, particularly for recurrent disease involving sensitive areas. The 2026 pediatric AD guideline strongly recommends both topical corticosteroids and topical calcineurin inhibitors as evidence-based treatments [2].Newer non-steroidal topical agents targeting inflammatory pathways have also expanded treatment options. The 2026 guideline includes strong recommendations for several topical therapies, including crisaborole, roflumilast, ruxolitinib, and tapinarof where age, regulatory approval, and individual clinical circumstances are appropriate [2].

3. Bathing and Wet-Wrap Therapy

Regular bathing can remove crusts, irritants, allergens, and microorganisms from the skin while providing an opportunity for subsequent moisturizer application. Harsh soaps, fragrances, and aggressive cleansing products should be minimized because they may exacerbate epidermal barrier dysfunction.Wet-wrap therapy may be considered during significant exacerbations. It involves application of topical therapy followed by a moist layer and an outer dry layer. This approach can enhance skin hydration and the effectiveness of topical treatments. Current pediatric guidelines provide conditional support for bathing and wet dressings in appropriate patients [2].

4. Systemic and Biological Therapy

Most children can be managed with appropriate topical therapy and skin care. However, moderate-to-severe disease that remains inadequately controlled may require systemic treatment under specialist supervision.Advances in understanding type 2 inflammation and intracellular signaling pathways have resulted in the development of targeted biological and small-molecule therapies. The 2026 pediatric guideline strongly recommends several evidence-supported systemic treatments for appropriate pediatric populations, including biologic agents and Janus kinase inhibitors. These include therapies such as dupilumab and other newer targeted agents, depending on patient age, disease severity, regulatory approval, contraindications, and individual risk–benefit assessment [2].Traditional systemic immunosuppressive agents, including methotrexate, cyclosporine, azathioprine, and mycophenolate mofetil, may still have a role in selected cases. In contrast, routine systemic corticosteroid therapy is strongly discouraged for long-term management because of adverse effects and the potential for rebound exacerbation after discontinuation [2].

Table 2. Main Strategies for Management and Prevention of Exacerbations

Strategy	Main purpose	Expected benefit
Regular moisturizer use	Restore epidermal barrier	Reduces xerosis and supports disease control
Appropriate topical anti-inflammatory therapy	Suppress active inflammation	Reduces erythema, itching, and flare severity

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Avoidance of individual irritants	Reduce barrier damage	May decrease frequency of exacerbations
Appropriate bathing and gentle skin care	Maintain clean, hydrated skin	Supports barrier function
Wet-wrap therapy in selected cases	Intensify topical treatment	May improve significant flares
Early identification of infection	Prevent infectious complications	Reduces risk of worsening disease
Caregiver education	Improve treatment adherence	Supports long-term control
Specialist systemic/biologic therapy	Control moderate-to-severe refractory disease	Reduces disease activity in selected patients

Primary Prevention of Atopic Dermatitis

Primary prevention aims to prevent disease development before clinical manifestations appear. Because epidermal barrier dysfunction can precede visible eczema, early moisturizing strategies have been extensively investigated.However, current evidence does not demonstrate that routine daily emollient therapy in all high-risk infants reliably prevents atopic dermatitis. In the five-year follow-up of the BEEP trial, the prevalence of physician-diagnosed AD was not significantly reduced by daily emollient application during the first year of life [4].

The 2026 AAD prevention guideline provides only a **conditional recommendation** for moisturizing skin care as a strategy to reduce the occurrence of pediatric AD, reflecting remaining uncertainty in the evidence [3]. The guideline also does not support routine use of interventions such as probiotics, vitamin D supplementation, or specific feeding practices solely for the purpose of preventing atopic dermatitis [3].Consequently, parents should not be advised that any single intervention can reliably prevent AD. Prevention should instead focus on gentle skin care, avoidance of unnecessary irritation, maintenance of general child health, and recognition of early signs in children at increased risk.

Prevention of Exacerbations

In children with established atopic dermatitis, preventing recurrent flares is a major component of long-term care. Effective secondary prevention includes regular moisturizer use even during periods of remission, appropriate anti-inflammatory treatment at the first signs of recurrence, avoidance of confirmed individual irritants, and adherence to an individualized skin-care plan.Common exacerbating factors may include excessive heat and sweating, dry environmental conditions, fragranced products, harsh detergents, rough clothing, repeated mechanical irritation, and skin infections. However, triggers differ among individuals, and unnecessary extensive restrictions should be avoided.

Maintaining short fingernails and controlling inflammation may reduce skin damage caused by scratching. Cotton or other comfortable clothing may be useful when rough fabrics aggravate symptoms.

Prevention of Infectious Complications

Control of skin inflammation and restoration of the epidermal barrier are central to reducing the risk of secondary infection. Routine use of topical antimicrobial agents on uninfected atopic dermatitis is not generally recommended, and the 2026 guideline conditionally recommends against routine topical antimicrobial therapy [2].When clinical bacterial infection develops, treatment should be selected according to the type and severity of infection. Recurrent or severe infections warrant additional clinical evaluation. Because S. aureus is frequently involved in infectious exacerbations of

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AD, effective long-term control of skin barrier dysfunction and inflammation is particularly important [6, 8].

Role of Education and Family Participation

Atopic dermatitis requires active participation by parents and caregivers because most treatment is performed at home. Poor adherence may result from fear of topical corticosteroids, misunderstanding of chronic disease, complex treatment regimens, inconvenience of moisturizer application, or unrealistic expectations of permanent cure.Educational interventions should explain the chronic relapsing nature of atopic dermatitis, appropriate quantities and methods of topical treatment, the difference between maintenance skin care and flare therapy, signs of infection, and circumstances requiring medical reassessment.An individualized written treatment plan can improve consistency of care and help families understand what treatment to use during remission and what changes should be made during exacerbations.Overall, successful management and prevention of pediatric atopic dermatitis require an integrated approach combining maintenance of epidermal barrier function, effective control of inflammation, prevention of infection, identification of clinically relevant triggers, appropriate escalation of therapy, and continuous education of children and caregivers.

CONCLUSION

Atopic dermatitis is a chronic, relapsing inflammatory skin disease that commonly begins in infancy or early childhood and may persist for many years. Its clinical course varies according to age, disease severity, genetic predisposition, environmental exposures, and associated atopic conditions. Pruritus, xerosis, recurrent eczematous lesions, and sleep disturbance are among the most important clinical manifestations and can significantly affect the quality of life of both children and their families.Effective management of pediatric atopic dermatitis requires a comprehensive and individualized approach. Regular use of moisturizers, appropriate topical anti-inflammatory therapy, gentle skin care, avoidance of confirmed irritants, and timely treatment of infectious complications are the main components of long-term disease control. In children with moderate-to-severe disease that does not respond adequately to topical treatment, modern biologic and targeted systemic therapies provide additional therapeutic options.Prevention should focus not only on the possible reduction of disease development in high-risk children but also on preventing recurrent exacerbations in patients with established atopic dermatitis. Current evidence shows that no single preventive intervention can completely prevent the onset of atopic dermatitis. Therefore, maintaining skin barrier function, minimizing unnecessary irritation, recognizing early symptoms, and educating parents and caregivers remain essential preventive strategies.In conclusion, early recognition, appropriate skin care, evidence-based anti-inflammatory treatment, prevention of complications, and active family participation can significantly improve disease control and quality of life in children with atopic dermatitis. Continuous application of updated clinical recommendations is important for achieving safe, effective, and long-term management of this common pediatric condition.

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