Practice Parameter: Algorithmic Management of Atopic Dermatitis

Indian Academy of Pediatrics – Allergy and Applied Immunology Chapter

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Drafted by: Dr Shalini Tyagi (Noida), Dr. Mangai Sinha (Navi Mumbai), Dr Richa Thukral (Delhi)

Co-ordinated by Dr. Sinchana Bhat (Mangalore)

Introduction

Atopic dermatitis (AD) is the most common chronic pruritic inflammatory skin disease in children and adolescents, affecting ~20% of the pediatric population. It usually begins in infancy: 45% present by 6 months, 60% by 12 months, and 85% by 5 years. Around 70% remit before adolescence, while 25% persist into adulthood.

Pruritus and disturbed sleep are hallmark problems, leading to impaired quality of life, behavioral changes, and significant family stress. AD often represents the first step of the “atopic march” leading to asthma, allergic rhinitis, and food allergy.

I. Clinical Diagnosis of Atopic Dermatitis

A.Atopic dermatitis symptomatology and distribution depend on the patient's age at presentation. Atopic dermatitis typically presents during the first year of life with erythematous papules, patches, or plaques on the face (especially the cheeks), scalp, trunk, and extremities. Older children typically present with patches on the flexural surfaces. Adults may present with dry, scaly patches on the extremities.

Pruritus is the most common and burdensome symptom of atopic dermatitis. Repeated scratching triggers a self-perpetuating **itch-scratch cycle**, which can have a significant impact on the patient's quality of life. Children (47%-80%) and adults (33%-87%) frequently report sleep disturbance, with worse sleep quality in patients with severe, active disease and consequent negative impact on daytime mood, behavior, and productivity.

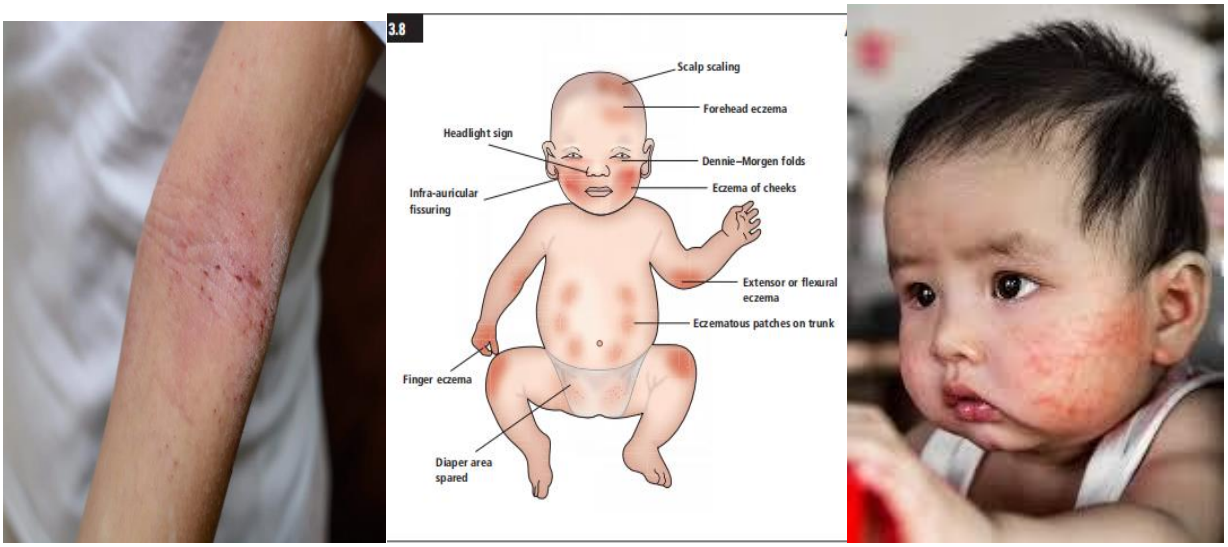


Fig. Typical presentation and distribution of AD in children

Pathogenesis

AD is caused by a complex interplay of genetic and environmental factors Cause is multifactorial-involves skin barrier defects especially the filaggrin gene mutations, immune dysregulation, and environmental interactions (microbial dysbiosis, irritant and allergen exposure)

B. Criteria (Adapted from Hanifin & Rajka / AAD)

Diagnostic criteria

Atopic dermatitis is a clinical diagnosis with no definitive laboratory test. Total IgE may be elevated in 80% of patients. Total IgE, allergen specific IgE, Skin prick testing, food allergy testing is nonspecific and not recommended in most cases unless associated with Allergic asthma Allergic rhinitis or food hypersensitivity.

Following are the **American Academy of Dermatology Diagnostic criteria** for Atopic Dermatitis adapted from Hanifin and Rajka criteria.

ESSENTIAL FEATURES-must be present
1. Pruritus
2 Eczema (acute, subacute, chronic)
3.Chronic or relapsing history
4.Typical morphology and age specific patterns*
**Patterns include* *1. Facial, neck and extensor involvement in infants and children* *2. Current or previous flexural lesions in any age group (folds of elbows, behind the knee, fronts of ankles or around the neck)* *3. Sparing of groin and axillary regions*
IMPORTANT FEATURES-Seen in most cases, adding support to diagnosis
1.Early age of onset
2.Atopy-personal or family history of Asthma or allergic rhinitis or history of atopic disease in first degree relative -IgE reactivity
3.Xerosis or dry skin
ASSOCIATED FEATURES-These clinical associations help to suggest the diagnosis of AD but are non specific
• Keratosis pilaris/pityriasis alba/ icthyosis/hyperlinear palms • Ocular and periorbital changes-Dennie Morgan lines/keratoconus/cataracts • Perioral/periauricular lesions • Facial pallor/white dermographism • Perifollicular accentuation/lichenification/prurigo lesions

C.Important differentials- Scabies, Seborrheic dermatitis, contact dermatitis, psoriasis, immune deficiency syndromes

Comorbidities, adverse effects and complications

Atopic dermatitis may represent the initial step of the so-called '**Atopic March'** Several comorbid atopic conditions may be associated- food allergy, asthma, allergic rhinitis.

Also associated with depression, anxiety, sleep impairment, neurocognitive impairment, skin infections and significant financial burden

II.Severity scoring for atopic dermatitis

The severity of atopic dermatitis is assessed using scoring systems like SCORAD, EASI and POEM (Patient oriented Eczema Measure)

SCORAD (Scoring Atopic dermatitis):

This index combines objective symptoms (extent and intensity of skin lesions) with subjective criteria (daytime pruritus and sleep loss)

Severity categories-based on the SCORAD score (out of 103) AD is classified as Mild (<25), Moderate (25-50) and Severe (>50)

EASI (Eczema Area and Severity Index)

This index assesses body surface area affected and intensity of skin lesions on four main signs (erythema, edema, excoriation and lichenification)

Severity categories-0-Clear, 0.1-1=Almost Clear, 1-7=Mild, 7.1-21=Moderate, 21.1-50= Severe and >50= very Severe

III.ATOPIC DERMATITIS MANAGEMENT

Maintenance skin care

1. Tips for bathing and moisturizing

Regular moisturizing of skin is important for eczema. Moisturized skin helps relieve dryness and itching and it helps to restore the skin barrier, keeping out allergens and irritants. Moisturizers can be the main primary treatment for mild disease and should be an integral part of the regimen for moderate and severe disease. They are also an important component of maintenance treatment and prevention of flares.

- Bathe or shower in lukewarm (not hot) water for a short period of time (about 8-10 minutes at least once every day.
- Use a gentle cleanser (not soap) that is unscented, fragrance free and dye free.
- Lightly pat the skin dry and do not rub the skin
- Liberally apply a high oil content moisturizer all over the body to seal in moisture. Try to do this within 3 minutes to limit the amount of moisture lost from skin. Moisturize at least once daily and ideally 3-4 times daily.
- Choose moisturizers that are fragrance free and free from irritants.
- Ointments and creams have higher oil content than lotions. Look for products containing ceramides, glycerol, lanolin, urea and paraffin.

2. Avoiding triggers

Common triggers for AD include-

- Fabrics-wool, latex, synthetic fabrics. Cotton clothing is best next to skin.
- Pets and Insects-Pet dander, cockroaches, insect bites and stings
- Environment-Pollen, dust mites, mold, cigarette smoke
- Weather-Changing temperatures, humidity, extreme heat and cold
- Fragrance-Perfumes, other scented products
- Stress-Life stressors, anxiety, new challenges

3. Pharmacological Measures (topical)

1.Topical corticosteroids

2. Topical Calcineurin inhibitors

The use of topical medications for AD treatment can be divided into 2 phases

(1) treatments for uncontrolled disease (active disease, also referred to as flares), or otherwise referred to as **induction of remission**

(2) intermittent therapy to treat subclinical inflammation and prevent a future flare, also called **maintenance therapy**

Another term for regular use of topical treatments to prevent a future flare is **proactive therapy**.

Topical corticosteroids (TCS)

TCS are the mainstay of anti-inflammatory therapy in AD in both adults and children. TCS have been used to treat AD for more than 60 years. They are typically introduced into the treatment regimen after failure of lesions to respond to good skin care and regular use of moisturizers alone.

- Use of mid- or higher-potency TCS for short courses may be appropriate to gain rapid control of symptoms
- For long-term management, the least-potent corticosteroid that is effective should be used to minimize the adverse effects. Greater caution regarding TCS potency is also needed when treating thin skin sites (i.e. face, neck, genitalia and other skin folds) where there is greater penetration and higher likelihood for systemic absorption.
- Steroids should be used maximally for 2-4 weeks followed by a step-down approach.
- Children with more severe eczema who experience very frequent flares are sometimes advised to use topical steroids as a **'weekend therapy'** when topical steroids are applied on 2 consecutive days a week to the areas where the eczema usually flares, for several months at a time.
- Once a day application is as good as twice a day application
- It is recommended waiting about 15 minutes between applying a topical steroid and applying the moisturizing product. This allows the steroid to be absorbed properly
- Topical steroid is produced with different bases as vehicles. There are preferred formulations for different sites of body for better application and absorption such as ointments, creams, lotions, solution, foam, gels etc

Potency of steroids table

Potency	Class	Generic (Brand)	Strength (%)
High	1	Betamethasone dipropionate	0.05
		Clobestasol propionate	0.05
		Halobetasol propionate	0.05
	2	Desoximetasone	0.05, 0.25
		Fluocinonide	0.05
Medium	3	Betamethasone valerate	0.1
		Triamcinolone acetate	0.1, 0.5
	4	Flurandrenolide	0.05
	5	Fluticasone propionate	0.05
Low	6	Desonide	0.05
	7	Hydrocortisone	0.5-2.5

Generally limit high potency TCS to <2 weeks duration

Quantity of application-

Fingertip unit (FTU)-suggested method include use of the FTU (the amount from the distal interphalangeal joint to the fingertip, or approximately 0.5 g, being applied over an area equal to 2 adult palms), following the rule of 9's that measures the percent affected area, and use of charts.

SKIN AREA	FACE AND BACK OF NECK	ARM AND HAND	LEG AND FOOT	CHEST AND BELLY	BACK AND BUTTOCKS
AGE	Finger tip unit (FTU) or 0.5 g of ointment				
3-6 MONTHS	1	1	1.5	1	1.5
1-2 YEARS	1.5	1.5	2	2	3
3-5 YEARS	1.5	2	3	3	3.5
6-10 YEARS	2	2.5	4.5	3.5	5

CHILDREN | Table: Amount of ointment for children

Local side effects of TCS

- Burning or stinging sensation upon application (usually temporary)
- Skin thinning (atrophy)
- Stretch marks (striae)
- Easy bruising
- Increased hair growth (hypertrichosis)
- Contact dermatitis (allergic reaction to the steroid or vehicle)
- Increased risk of skin infections (bacterial, fungal, viral) or masking of infections

Systemic side effects are rare with proper use but can occur with prolonged use of high-potency steroids over large areas, especially in infants. These can include:

- Suppression of the hypothalamic-pituitary-adrenal (HPA) axis
- Cushing's syndrome-like symptoms
- Growth retardation in children
- Increased blood sugar levels
- Osteporosis
- Ocular side effects (glaucoma, cataracts) with prolonged use near the eyes

Topical Calcineurin Inhibitors (TCIs)

- Topical calcineurin inhibitors (TCIs) are medications applied to the skin to treat AD particularly for moderate to severe cases.
- TCIs inhibit calcineurin, an enzyme that plays a key role in activating T-cells.By blocking calcineurin, these medications suppress the release of inflammatory cytokines, reducing inflammation and itching
- TCIs are non-steroidal and are used as an alternative to or in conjunction with topical corticosteroids.

Commonly Used TCIs

- **Tacrolimus -** 0.03%for children (2-15 yrs) and 0.1% for adults
- **Pimecrolimus** (Elidel)-1% cream (>3 months of age)

Advantages of TCIs

- Non-steroidal**:** They do not cause skin thinning (atrophy) or other side effects associated with long-term use of topical corticosteroids.
- Suitable for sensitive areas**:** TCIs can be used on the face, neck, skin folds, and other areas where potent corticosteroids should be avoided.
- Long-term use**:** TCIs can be used for long-term management of atopic dermatitis.

Potential Side Effects

- Burning or stinging sensation
- Itching
- Redness
- Skin irritation
- Increased risk of skin infections
- Folliculitis

4.Wet wrap therapy

Wet-wrap therapy may be useful during severe flares of atopic dermatitis. A topical corticosteroid is applied to affected areas and covered with a moistened cotton suit (eg, pajamas or wet gauze strips). The wet wrap may be kept for several hours or up to 24 hours and after removal, an emollient is applied.

5.Bleach Baths

To prevent *Staphylococcus aureus* skin infections. Controlling colonization may be useful for those with severe or recalcitrant disease**.** Twice weekly 5 to 10-minute baths to which standard (not concentrated) household bleach is added (½ cup in a full tub of water [40 gallons], 1/8 cup in a tub ¼ full of water)

6. Other Measures

- Phototherapy: ultraviolet light in the narrow band UVB range-In resistant cases.
- Antibiotics: Topical or Oral-Whenever there is skin infection.
- Oral Glucocorticoids: Short course of low dose steroids, 0.5 mg/kg/day upto1week can be used for acute flare-ups.
- Dietary elimination is not recommended.
- Allergen immunotherapy-in patients with allergic rhinitis or allergic asthma

7.Newer Modalities

There have been several advancements in the treatment of atopic dermatitis in children. In the recent years drugs that modify the immune system have been included in the treatment of moderate to severe cases of atopic dermatitis in children that do not respond well to conventional treatment

Immunosuppressive drugs

Cyclosporin, Methotrexate, Azathioprine, Mycophenolate Mofetil for resistant AD

(a)Cyclosporine (Cs A) is an oral calcineurin inhibitor that suppresses the activation of the T-cell transcription factor, nuclear factor of activated T cells, inhibiting the transcription of a number of cytokines, including IL-2. It decreases both the surface area of involvement and the degree of inflammation of dermatitis within 6 weeks.

- Children Above 2 yrs: 2-5 mg/kg/day, divided into two doses

  Duration of therapy is generally 3-6 months

  Dose adjustments may be needed based on renal function and response to treatment.

(b) Biologicals

- **Dupilumab**

Dupilumab is a fully human monoclonal antibody directed against the IL-4a receptor a-subunit, which blocks the signalling of both IL-4 and IL-13, the two key drivers of type 2 immune response. FDA approved for adults and children > 6 months of age with moderate to-severe AD

Used subcutaneously every 2-4 weeks

- **Tralokinumab** is a newer-to-market IL-13 inhibitor that was approved by the FDA in in December 2023 for moderate-to-severe atopic dermatitis in adolescents 12–17 years of age.

(c) Phosphodiesterase-4 inhibitors:

Crisaborole:

- Crisaborole is a topical phosphodiesterase-4 inhibitor that reduces the production of proinflammatory cytokines.
- It is used in children aged 2 years and older with mild to moderate atopic dermatitis.

- It reduces inflammation and itching by inhibiting PDE4, which plays a role in immune responses.
- Dose and Duration: Crisaborole 2% ointment is applied twice daily to affected areas. Treatment duration is typically 4 weeks, but can be extended based on response.

Side Effects:

- Mild burning or stinging at the application site.
- Allergic reactions like redness or swelling is rare.
- No systemic immunosuppressive effect

(d) Janus Kinase Inhibitors

Ruxolitinib is a topical selective JAK1/2 inhibitor - FDA approved for mild-to-moderate AD. It is indicated for short-term and non-continuous chronic treatment of AD in non-immunocompromised individuals.

Can be used in children more than 12 years of age: applied twice daily to the affected areas

Upadacitinib and Abrocitinib are oral JAK-1 inhibitors approved for children 12 years and older with moderate to severe AD uncontrolled on other systemic treatments

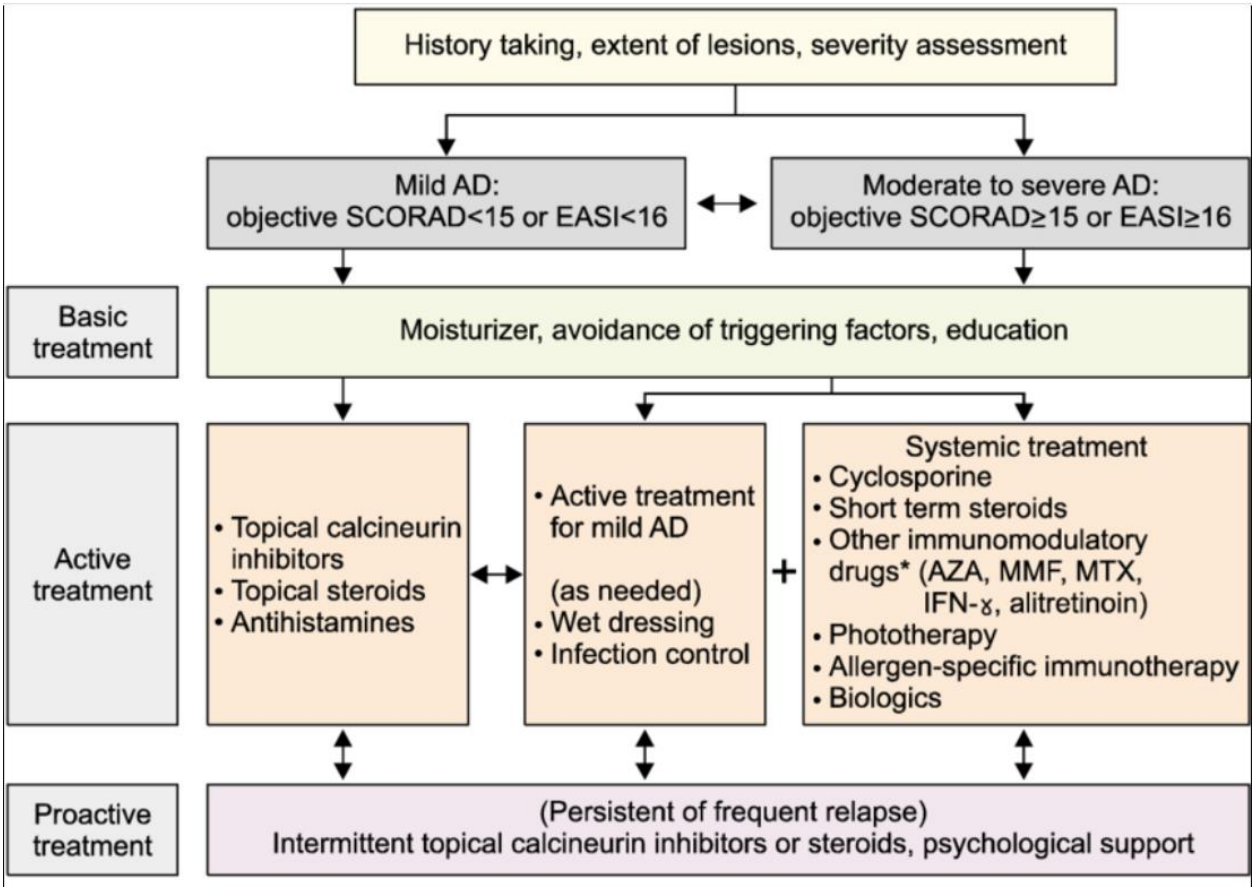
Common Side Effects

- Nausea, Headache, Cold or flu-like symptoms
- Increased blood creatine phosphokinase (CPK) levels
- Skin infections (impetigo, herpes simplex)

Serious Side Effects

- Serious infections (e.g., herpes zoster, pneumonia, tuberculosis)
- Low platelet count
- Increased risk of malignancies (e.g., lymphoma)
- Gastrointestinal issues (e.g., severe abdominal pain, vomiting)
- Hypersensitivity reactions (e.g., swelling, difficulty breathing)

Treatment Algorithm for AD in children



IV. Follow-Up & Monitoring

- Reassess severity using SCORAD/EASI every 4–6 weeks
- Taper topical/systemic therapy to lowest effective dose
- Monitor for complications (infections, growth delay, ocular effects)
- Annual review for systemic/biologic therapy safety

V. Complications to Monitor

- Skin infections (bacterial, viral, fungal)
- Ocular complications (cataracts, keratoconus)
- Growth delay (rare, with prolonged steroids)
- Psychosocial: poor sleep, anxiety, depression

VI. Education & Counseling

- Emphasize daily skincare and adherence
- Clarify steroid safety (when used correctly)
- Address family concerns about chronicity and relapses
- Counsel on allergen/trigger avoidance and stress management
- Encourage consistent follow-up

SUGGESTED READING:

1.Atopic dermatitis (eczema) guidelines: 2023 American Academy of Allergy, Asthma and Immunology/American College of Allergy, Asthma and Immunology Joint Task Force on Practice Parameters GRADE– and Institute of Medicine–based recommendations. Chu, Derek K. et al. Annals of Allergy, Asthma & Immunology, Volume 132, Issue 3

2. Guidelines of care for the management of atopic dermatitis. Eichenfield, Lawrence F. et.al. Journal of the American Academy of Dermatology, Volume 70, Issue 2, Feb 2024

3. A systematic review of guidelines for the management of atopic dermatitis in children.Maya et al. World Allergy Organization Journal, Volume 17, Issue 12,100989, Dec.2024.