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PEDIATRIC ALLERGIC CONTACT DERMATITIS (ACD)

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ABSTRACT Allergic Contact Dermatitis (ACD) is a delayed-type hypersensitivity reaction increasingly recognized in children, though often underdiagnosed due to clinical overlap with atopic dermatitis. Pediatric ACD typically presents as pruritic, erythematous, or vesicular lesions localized to areas exposed to allergens, with common triggers including nickel, fragrances, and preservatives. Diagnosis relies on clinical assessment and standardized patch testing, the gold standard for allergen identification. Histology reveals spongiosis, acanthosis, and perivascular lymphocytic infiltration. Management includes allergen avoidance and topical corticosteroids, with calcineurin inhibitors used for sensitive areas. The rising incidence in industrialized settings reflects increased exposure to sensitizers. Prognosis is favourable with early diagnosis and appropriate intervention.

KEYWORDS : Dermatitis, Hypersensitivity, Patch testing, Allergen, Corticosteroids, Pediatrics.

INTRODUCTION

Pediatric Allergic Contact Dermatitis (ACD) is a delayed-type (Type IV) hypersensitivity reaction triggered by environmental allergens in children. It typically appears 24–72 hours after exposure, presenting with erythema, pruritus, vesiculation, or lichenification, depending on the severity. Common pediatric allergens include nickel, fragrances, preservatives, rubber, and topical medications. Diagnosis is often challenging due to clinical overlap with atopic dermatitis and other eczematous conditions. Milder cases may involve limited facial or hand lesions, while chronic forms can cause thickening and fissuring at sites of repeated exposure. Early recognition and allergen avoidance are essential to prevent recurrence and preserve skin health and quality of life.

Outbreaks Of Pediatric Allergic Contact Dermatitis (ACD)

While Pediatric ACD is non-infectious, localized outbreaks may occur in settings like schools, daycare centers, or hospitals where multiple children are exposed to a common allergen. Reported clusters have involved allergens such as nickel in toys, rubber materials, preservatives in wipes (e.g., methylisothiazolinone), and plant resins. These outbreaks are often misdiagnosed as irritant dermatitis or atopic eczema, delaying appropriate management. Identification and removal of the causative allergen, along with education of caregivers and staff, are essential. Preventive strategies include using hypoallergenic products, reviewing ingredient lists, and ensuring early dermatological evaluation when multiple children present with similar dermatitis.

Pathogenesis

Pediatric Allergic Contact Dermatitis (ACD) is a T-cell–mediated Type IV hypersensitivity reaction. It begins with sensitization, where an antigen penetrates the immature skin barrier, binds to epidermal proteins, and is presented by Langerhans cells to T lymphocytes in regional lymph nodes. Upon re-exposure, memory T cells trigger an inflammatory cascade, releasing cytokines like IL-2, IFN-γ, and TNF-α. This leads to epidermal inflammation, spongiosis, and mononuclear cell infiltration. The immature skin and immune system in children can enhance allergen absorption and inflammation. Histologically, ACD shows intraepidermal vesicles, acanthosis, and perivascular lymphocytic infiltrates, sometimes with eosinophils.

Symptoms Of Pediatric Allergic Contact Dermatitis (ACD)

- Onset typically 24–72 hours after allergen exposure.
- Localized redness (erythema), itching (pruritus), and swelling (edema).
- Dryness, scaling, and sometimes vesicles or crusting.
- Chronic cases may develop skin thickening (lichenification).
- Commonly affects the face, hands, diaper area, and sites under jewellery or clothing fasteners.
- No systemic symptoms like fever present.
- Intense itching may cause sleep disturbances and irritability.
- Untreated cases risk chronic inflammation and secondary infections.

Progression Of Pediatric Allergic Contact Dermatitis (ACD)

- Development of sharply defined redness (erythema) and tenderness.
- Intense itching with small fluid-filled blisters (vesicles) that may rupture and crust.
- Peeling or flaking skin as inflammation subsides.
- Chronic exposure can cause thickened, leathery (lichenified) skin.
- Risk of secondary bacterial infections if untreated.
- Skin barrier disruption leading to increased sensitivity.
- Sleep disturbances and irritability, especially in young children.
- Early allergen identification and topical treatment are essential for healing.

Investigations

- **Diagnosis Is Mainly Clinical:** history of exposure, lesion location, and symptom timing.
- Patch testing is the gold standard for allergen identification; performed over 48–96 hours, usually in children >6 years.
- Skin biopsy useful in atypical cases; shows spongiosis, acanthosis, and perivascular lymphocytic infiltrates with eosinophils.
- Cultures are only if secondary bacterial infection is suspected; primary ACD lesions are sterile.
- Review and test shared products (e.g., wipes, soaps) in group settings to identify common allergens like nickel, preservatives, and fragrances.

Treatment Of Pediatric Allergic Contact Dermatitis (ACD)

- Focus on identifying and avoiding causative allergens.
- Most cases are managed out of the hospital without hospitalization.
- **First-line Therapy:** topical corticosteroids (mild to moderate potency based on location).
- Calcineurin inhibitors (e.g., tacrolimus) for sensitive areas or long-term use.
- **Supportive Care:** oral antihistamines to reduce itching, emollients to repair the skin barrier.
- Antibiotics only if secondary bacterial infection develops.
- Referral for patch testing in recurrent, severe, or unclear cases.
- Symptoms usually resolve within 1–2 weeks with proper treatment.

Prevention Of Pediatric Allergic Contact Dermatitis (ACD)

To reduce the risk of ACD in children, especially those with known sensitivities, the following preventive measures are recommended:

- Avoid known allergens such as nickel, fragrances, rubber, preservatives (e.g., MI, MCI), and certain plants.
- Use fragrance-free, hypoallergenic products (soaps, shampoos, lotions, wipes).
- Choose natural fabrics like cotton; wash new clothes before use.
- Avoid nickel-containing items, especially jewellery, belt buckles, and clothing fasteners.
- Discourage sharing of personal care items in schools or day care.
- Use barrier creams or gloves when handling potential allergens.
- Keep fingernails trimmed to reduce scratching and risk of

infection.
- Moisturize regularly to maintain skin barrier integrity.
- Wash exposed skin after outdoor play or potential allergen contact.
- Consult a pediatric dermatologist for patch testing in recurrent or severe cases.

Complications Of Pediatric Allergic Contact Dermatitis (ACD)

If untreated or repeatedly exposed to allergens, Pediatric ACD may lead to:
- Secondary bacterial infections (e.g., impetigo, cellulitis) due to scratching and skin barrier breakdown
- Chronic dermatitis with lichenification, hyperpigmentation, or hypopigmentation
- Sleep disturbances, affecting mood, behavior, and daily functioning
- Scarring, rarely occurring in severe or infected cases
- Reduced quality of life, impacting school, play, and emotional well-being
- Sensitization to new allergens from ongoing skin barrier disruption
- Early diagnosis and allergen avoidance are key to preventing complications.

Key Points: Pediatric Allergic Contact Dermatitis (ACD)
- ACD is a T-cell-mediated delayed hypersensitivity reaction caused by skin contact with allergens in sensitized children.
- Common allergens include nickel, fragrances, preservatives, rubber, and topical medications found in toys, clothing, wipes, and personal care products.
- Diagnosis is primarily clinical; patch testing is the gold standard for persistent or recurrent cases.
- Biopsy may aid in atypical cases, showing spongiosis, acanthosis, and perivascular lymphocytic infiltrate.
- Treatment centers on topical corticosteroids and emollients, with strict allergen avoidance to prevent recurrence.
- Antihistamines relieve itching; antibiotics are used only for secondary infections.
- Early identification and avoidance reduce complications such as chronic dermatitis, sleep disturbance, and infections.
- Education of caregivers and school staff on allergens and skin care is crucial for long-term management.

Case Studies: Pediatric Allergic Contact Dermatitis (ACD)

- **Scenario 1:**

A 7-year-old with itchy, red patches on hands and face linked to metal jewellery. Patch testing confirmed nickel allergy. Family educated on allergen avoidance and gentle skin care.

- **Scenario 2:**

A 3-year-old infant with persistent diaper-area dermatitis due to preservatives in baby wipes. Symptoms improved after discontinuation and topical corticosteroids. Parents were advised on hypoallergenic products and skin hydration.

- **Scenario 3:**

A 12-year-old with atopic dermatitis experienced worsening eczema from rubber in sports equipment. Patch testing confirmed rubber allergy. The nurse coordinated allergen removal and topical treatment initiation.

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