

Management of Pediatric Atopic Dermatitis

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Received: June 06, 2019; **Published:** June 21, 2019

Abstract

Introduction: Atopic dermatitis (AD) is generally defined as a multisystem inflammatory condition that is present among the spectrum of conditions of atopy, that includes Atopic dermatitis, food allergies, environmental allergies, and asthma, all of which are becoming more common. Most atopic conditions begin in young ages, with eighty-five percent of Atopic dermatitis cases presenting by age five years and about twenty-five percent of children experiencing asthma or dermatitis clinical manifestations by their late teen years.

Aim of Work: In this review, we will discuss the management of pediatric atopic dermatitis.

Methodology: We did a systematic search for the management of pediatric atopic dermatitis using PubMed search engine (<http://www.ncbi.nlm.nih.gov/>) and Google Scholar search engine (<https://scholar.google.com>). All relevant studies were retrieved and discussed. We only included full articles.

Conclusions: Atopic dermatitis is a chronic inflammatory skin and multi-system disease that impacts children differently in different age groups. Consideration for the presence/absence of different comorbidities is considered to be important when providing care for children with Atopic dermatitis. Infantile Atopic dermatitis can be complicated by overlap with irritant contact dermatitis and seborrheic dermatitis. School-aged children with Atopic dermatitis usually suffer intercurrent infections with viral and bacterial pathogens. Teenagers with Atopic dermatitis might have impaired body images and are more prone to certain types of allergic contact dermatitis. Atopic dermatitis is a complex multisystem disorder with its greatest symptom in the skin. Therapy changes according to age and developmental stage of childhood, and nuances in care must be addressed to allow for maximal disease control throughout childhood and adolescent years.

Keywords: *The Management; Pediatric; Atopic Dermatitis; Dermatology; Review*

Introduction

Atopic dermatitis (AD) is generally defined as a multisystem inflammatory condition that is present among the spectrum of conditions of atopy, that includes Atopic dermatitis, food allergies, environmental allergies, and asthma, all of which are becoming more common. Most atopic conditions begin in young ages, with eighty-five percent of Atopic dermatitis cases presenting by age five years and about twenty-five percent of children experiencing asthma or dermatitis clinical manifestations by their late teen years [1]. The incidence of atopic illnesses has increased by two to five folds since the 1960s in developing countries among children and adolescents, with a recent estimate of being present in about seventeen percent of five-to-nine-year-old children in Oregon state [2]. Based on this, asthma was found to have a prevalence increasing between the 1960s and the 1980s of 183 to 284 per 100,000, with this raise being accounted for by children aged one-fourteen years, and especially higher for children with at least one parent with asthma [3]. Atopic dermatitis has a wide reaching impact on childhood and the quality of life could be significantly affected following a diagnosis with pediatric Atopic dermatitis, reflecting the severity noted with other pediatric chronic illnesses, such as kidney conditions and cystic fibrosis [4]. The higher prevalence of allergic conditions has been accompanied by a raise in disease persistence, especially of severe Atopic dermatitis, into the adult years.

Factors which are associated with persistence are onset after two years of age and ongoing clinical manifestations for ten or more years and females in meta-analysis; thus, it is essential that we take into consideration not only the youngest patients with Atopic dermatitis, but the adolescent with long-term disease, who might have ongoing clinical manifestations for life.

In this review, we will discuss the most recent evidence regarding the management of pediatric atopic dermatitis.

Methodology

We did a systematic search for the management of pediatric atopic dermatitis using PubMed search engine (<http://www.ncbi.nlm.nih.gov/>) and Google Scholar search engine (<https://scholar.google.com>). All relevant studies were retrieved and discussed. We only included full articles.

The terms used in the search were: the management, pediatric, atopic dermatitis, dermatology, review.

Infancy

This brief overview will include known features which are noted in infancy that affect diagnosis and management considerations in Atopic dermatitis. The clinical nuances may overlap with the presence of other comorbidities. Atopic dermatitis is defined as a pruritic eczematous disease with the presence of a long-term, relapsing course and a classical pattern of appearance, in infancy and early childhood of “facial, neck and extensor involvement” and usually associated with early onset of xerosis, and other forms of atopy [5].

Eczematous plaques in children could happen anywhere in the body but are likely to be limited to the face and extensor extremities. Children usually scratch incessantly and prior to having the dexterity to scratch they will usually rub or wiggle against other surfaces to itch. This activity could be paired with significant sleep disturbance, specifically in winter seasons when household heating reduces the humidity. Severity can vary from a few small plaques to erythrodermic appearance, which must be carefully distinguished from the presence of underlying immunodeficiencies like Leiner’s disease [6]. Widespread pathologies in childhood is common because of the impaired skin barrier and the presence of a thinner stratum corneum layer, making it possible for greater exposure to irritants and allergens. This phenomenon is mirrored in clinical studies by a higher trans-epidermal water loss.

Although more recent guidelines indicate that Atopic dermatitis must be diagnosed in the exclusion of irritant contact dermatitis (ICD), allergic contact dermatitis (ACD) and seborrheic dermatitis, they do actually overlap at times and these cases might be commoner in infancy especially when there is Atopic dermatitis or a predisposition to Atopic dermatitis. Atopic dermatitis is increased by skin contact with chemical and/or physical irritants like excessive washing, soaps, and detergents [7]. Facial Atopic dermatitis in childhood is usually complicated by an overlap with irritant contact dermatitis which is caused by drool (aggravated with teething), messy eating, and the

necessity for cleaning the face. Decreased indoor humidity might increase head and neck Atopic dermatitis [8]. Facial Atopic dermatitis in childhood is usually linked to cheek eczematous plaques. The presence of lesions on the lower cheek, where the saliva may pool, or under a pacifier, might point to a larger component of irritant contact dermatitis.

Irritant seborrheic dermatitis may overlap with Atopic dermatitis in childhood and it has long been suggested that this overlap is not actually random. Alexopoulos, *et al.* have recently found that there is a true association between the two conditions. In their review of an overall of eighty-seven children who were diagnosed with infantile irritant seborrheic dermatitis (mean age, 3.1 months), they were able to follow forty-nine children for five years, with thirty developing Atopic dermatitis characteristics at a later age-seven diagnosed with Atopic dermatitis concurrent to irritant seborrheic dermatitis and twenty-three diagnosed with Atopic dermatitis on average 6.4 months after irritant seborrheic dermatitis onset [9]. The notable three-fold raise in Atopic dermatitis prevalence among patients with irritant seborrheic dermatitis in this cohort highlights the fact that these two conditions could not be separated and, as reviewed elsewhere in this manuscript, therapy for Atopic dermatitis, specifically emollient-based care and irritant avoidance, should be initiated at irritant seborrheic dermatitis diagnosis. Atopic dermatitis in childhood usually involves the skin folds as well, with maceration of the neck, and antecubital and popliteal areas, sites which are known to be affected by Atopic dermatitis in older children. Yeast species including candida and *Malassezia furfur* could be isolated in these patients; thus, the addition of an anti-fungal that offers candida coverage might benefit young children with Atopic dermatitis and intertriginous disease.

There are a series of associations of childhood Atopic dermatitis with environmental exposures that has been explored recently in the literature. Some of the environmental associations have included pesticide exposure, laminated wood floors, carpeting, urban environment, and home mold [10]. In addition, maternal food allergy and allergic disease, prenatal antibiotics, and prenatal stress might contribute to childhood Atopic dermatitis incidence. consequently, it looks like some activities like nesting or redecorating might contribute to Atopic dermatitis triggering in the susceptible children.

Comorbidities

The original Hanifin and Rajka criteria included a list of almost two dozen minor clinical manifestations that have variable presence in infancy, depending on the age of the child. A number of these minor criteria are comorbidities of disease. Those that are of significant concern in childhood include the presence of irritant seborrheic dermatitis and irritant contact dermatitis, food allergy, the Atopic March, and prurigo. Comorbidities of Atopic dermatitis have recently been discussed in recent American Academy of Dermatology guidelines, which say that "Physicians must be aware of and evaluate for conditions linked to atopic dermatitis, such as rhinitis/rhino-conjunctivitis, asthma, food allergy, sleep disturbance, depression, and other neuro-psychiatric diseases, and it is suggested that practitioners discuss them with their patients as a part of the treatment plan, when appropriate" with a level of evidence of I, II (strength of recommendation C). An integrated, multidisciplinary approach was given level of evidence III with C strength of recommendation in the same guidelines; on the other hand, most children who have severe Atopic dermatitis need integrated care [11,12].

A recent US-based study studied the effects of early introduction of topical corticosteroids with the presence or absence of pimecrolimus (initially blinded and then with open-label application) as a primary prevention of the atopic march in children three to eighteen months of age with mild to moderate Atopic dermatitis looked at the incidence of food allergies in this specific population. at the end of study, about sixteen percent of participants had developed at least one food allergen, namely, peanut (6.6 percent) cow's milk (4.3 percent), and egg white (3.9 percent); seafood, soybean, and wheat allergies were relatively rare. A single recent study (the LEAP trial [Induction of Tolerance Through Early Introduction of Peanut in High- Risk Children]) has identified a four- to five-fold decrease in peanut protein allergy since age five years with early peanut protein; on the other hand, allergen screen and introduction are best conducted with an allergist in the setting of known or suspected peanut allergy [13]. Avoidance of known food allergens in skin care products is generally recommended as well in the setting of cases where there is an unknown refinement process and the presence or absence of the allergenic component is unknown. Food allergy testing is usually done in infants with Atopic dermatitis when there is (1) severe disease and/or persistent disease poorly responsive to topical treatment or (2) known food triggers. We further advise allergy testing in the setting of possibly problematic nutrition issues attributable to restrictive diets. Restrictive diets have not been advised in the treatment of moderate to severe Atopic dermatitis cases in the absence of proven allergens.

The atopic march

The term 'atopic march' means the theory that Atopic dermatitis in childhood and the associated abnormal skin barrier might allow for the occurrence of food allergy and asthma, that is, a march from the skin to other forms of atopy. This theory has some evidence that supports it, despite the fact that it might not describe the occurrence of disease in all patients. A variety of research has evaluated the atopic march in childhood from alternative perspectives. For example, a recent research supports the idea that percutaneous sensitization to foods might have a role in Atopic dermatitis children, owing to an impaired skin barrier. Household dust has been demonstrated as a possible source of peanut protein sensitization in infants aged three to fifteen months. The exposure-response association between peanut protein levels in household dust and peanut skin prick test sensitization is noted specifically in children with a history of Atopic dermatitis (OR, 1.9; 95% CI, 1.2 - 3.1; $P < .01$) and severe Atopic dermatitis (OR, 2.4; 95% CI, 1.3 - 4.4; $P < .01$) [14].

The Stop Atopic March study, a six-year trial that addressed the concept of tight Atopic dermatitis skin control in infants as a means of allergy prevention, compared three- to eighteen-month-old children who for three years enrolled in a double-blind trial in which they were randomized to receive pimecrolimus or vehicle and later received three years of open-label pimecrolimus.

The observed mean was 2.8 years and there were no significant differences between the groups, with thirty-seven percent developing comorbidities: asthma (10.7 percent), allergic rhinitis (22.4 percent), food allergy (15.9 percent), and allergic conjunctivitis (14.1 percent). Because both study arms provided fair disease control and barrier repair, it might be that the study design was not right to reveal potential therapeutic interventions needed to stop the atopic march [15].

Topical and oral medication risks and benefits

The abnormal skin barrier in children with Atopic dermatitis is of special concern because of the intrinsically thinner skin and high irritation risk within the infantile age group, noted mainly due to insufficient barrier development at birth. One of the most elucidating studies of the past few years has been a clinical trial that offered at risk infants (at least one parent with Atopic dermatitis) emollient versus no emollient daily from early childhood (by three weeks of age) and onward. At six months, the intervention resulted in approximately fifty-percent reduction in Atopic dermatitis. In addition, many groups have suggested the need to avoid fragrance in at risk or Atopic dermatitis infants. Recent guidelines from the American Academy of Pediatrics subsection on dermatology have recommended every two to three days bathing for ten to fifteen minutes, lukewarm water, gentle cleanser (fragrance-free Syndet or moisturizer enhanced), and daily emollient use. This is the most important part of therapy throughout life. In addition, fragrance-free, dye-free detergents, humidification for indoor heated homes, and cooling the home in hot summer months might improve care [16].

The eczema action plan

The eczema action plan is a goal-targeted direction sheet that aids parents of children with Atopic dermatitis to recount the discussion of the office visit regarding skin care and preventive measures as well as to empower parents to initiate treatments at the first sign of presence of flare. There are approximately ten parameters that might be present in these documents: (1) choice of cleansing techniques and cleansers, (2) application of classical topical treatments, one for the face/groin and one for the body, (3) rescue agents (a stronger topical treatment for resistant areas), (4) emollient application, (5) use of oral antihistamines, (6) use of topical antibacterial medications including mupirocin and bleach baths, (7) choice of detergent and clothing/fabric type, (8) control of temperature and humidity, (9) oral antibiotics in cases they are needed, and (10) other considerations, like sunscreens, allergen avoidance, and avoiding individuals with cold sores.

Many resources are present online that show possible eczema action plans varying from flare decrease plans to global skin care plans, all of which might be used by physicians to increase communication and compliance.

Topical medications

The topical treatment of infantile Atopic dermatitis is the main management of the Atopic dermatitis using the lowest potency topical corticosteroid to decrease and eliminate the localized disease flare. This usually means the use of class five or six topical corticosteroids

for the face and intertriginous areas and class three or four topical corticosteroids for non-facial areas. Rescue agents with a class two corticosteroid maybe used occasionally, specifically for severe flares of the condition.

Adverse events in infancy include insufficient clearance, stimulation of parental corticosteroid phobia, and less commonly the true adverse event of topical corticosteroids, including absorption and hypo-thalamic- pituitary-adrenal axis suppression, growth suppression, atrophy, and cataracts. Topical calcineurin inhibitors that are labeled as not intended for use under the age of two years have been endorsed as having evidence in support of their use for children under the age of two years who do not respond to topical corticosteroids. There are now some published data on the safety of pimecrolimus one-percent cream specifically for children with Atopic dermatitis for five years, that supports infantile use through early childhood [17].

Oral medications

Oral medications generally have a place in all age groups of childhood Atopic dermatitis. On certain occasion, oral cyclosporine is used; on the other hand, the main majority of children in the infantile age group are treated with topical medications and concomitant allergy screening/intervention. Oral anti-histamines are generally used to improve somnolence in children with severe pruritus in association with Atopic dermatitis. Sedating antihistamines include diphenhydramine and hydroxyzine. Dosage increases owing to relative decrease in efficacy must be avoided and avoidance in asthmatics with active clinical manifestations owing to the risk of respiratory suppression is highly advised. Paradoxical hyperreactivity is most common in younger children and signals the requirement to avoid the class of sedating antihistamines.

Oral antibiotics must only be used in the setting of extensive skin weeping, oozing, and/or the presence of pus discharge paired with a positive culture (usually *Staphylococcus* or *Streptococcus*). In these cases, antibiotics like cephalexin or oxacillin that have dual *Staphylococcus* or *Streptococcus* coverage are desirable, and cultures must be done to detect possible need for treatment of methicillin-resistant *Staphylococcus aureus*.

Toddlers

Atopic dermatitis signs and symptoms vary according to age. Although dermatitis involving the face, trunk, and/or extensor extremities predominates in infants, flexural surfaces including the wrists/ankles and antecubital/popliteal fossae are more frequent in toddlers and preschool- and school-aged children.

It might also present with other characteristics. The awareness of the prevalence of less frequent signs and symptoms of Atopic dermatitis according to age in different populations may be helpful in diagnosing incipient cases of Atopic dermatitis. Diaper dermatitis In infants, the “diaper area” is usually triggered by repeating cycles of skin wetting and drying as well as exposure to endogenous irritants (like drool, urine, and feces) or exogenous irritants (like cleansing products or components of the elastic border of diapers). The latter irritants are generally more common in toddlers with Atopic dermatitis [18].

Comorbidities

In children patients, Irritant contact dermatitis is most frequent on the face, dorsal aspect of the hands, and “diaper area,” often stimulated by frequent cycles of skin wetting and drying. The most effective way to alleviate Irritant contact dermatitis is with strict avoidance of likely triggers. When triggers could not be detected or prevented, or there is residual dermatitis after triggers have been removed, mild topical corticosteroids might decrease inflammation.

Conclusions

Atopic dermatitis is a chronic inflammatory skin and multi-system disease that impacts children differently in different age groups. Consideration for the presence/absence of different comorbidities is considered to be important when providing care for children with

Atopic dermatitis. Infantile Atopic dermatitis can be complicated by overlap with irritant contact dermatitis and seborrheic dermatitis. School-aged children with Atopic dermatitis usually suffer intercurrent infections with viral and bacterial pathogens. Teenagers with Atopic dermatitis might have impaired body images and are more prone to certain types of allergic contact dermatitis. Atopic dermatitis is a complex multisystem disorder with its greatest symptom in the skin. Therapy changes according to age and developmental stage of childhood, and nuances in care must be addressed to allow for maximal disease control throughout childhood and adolescent years.

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Volume 15 Issue 7 July 2019

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