



How Can Eczema Affect Other Comorbidities in Children? A Review

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Abstract

Atopic dermatitis, or eczema, is a common skin disorder that affects many children worldwide. This literature review will examine the different comorbidities associated with eczema in the pediatric population. This research is relevant to children and their guardians who are interested in learning about other conditions that are associated with eczema. This paper will investigate the pathophysiology of eczema in children, the relationship between eczema severity and comorbidity onset, the relationship between age and comorbidity onset, and allergic, psychological, and metabolic comorbidities associated with eczema. This paper aims to improve awareness of how eczema can affect different body systems in children.

How Can Eczema Affect Other Comorbidities in Children?

What if a common skin condition could affect more than just the skin? Atopic dermatitis, also known as eczema, is a common skin condition that affects approximately 12% of children in the US and is characterized by inflammation and itching (Frazier & Bhardwaj, 2020; Napolitano et al., 2022). Interactions between immune dysregulation, genetic predisposition, and environmental factors are major contributors to atopic dermatitis onset (Napolitano et al., 2022). Eczema can have a major impact on children's quality of life due to repeated itching or scratching of the skin (Frazier & Bhardwaj, 2020). Children with more severe eczema tend to have poorer health, more sleep problems, and require more medical attention than children with mild or moderate eczema (Silverberg & Simpson, 2013). Aside from its symptoms, atopic dermatitis is also associated with many allergic, psychological, and metabolic comorbidities, including asthma, anxiety, and obesity (Blanco Sequeiros et al., 2024; De Simoni et al., 2022; Miltner et al., 2024). Children with skin barrier impairment caused by eczema tend to have more sensitivity to food and inhaled allergens (Miltner et al., 2024). This paper will investigate the relationship between eczema and different comorbidities in children to better understand the multisystemic effects of eczema in children.

Pathophysiology of Eczema in Children

Atopic dermatitis, also known as eczema, is a chronic, relapsing skin disease characterized by intense itching, pain, and inflamed skin (Lyons et al., 2015). Genetic factors like immune pathway defects caused by gene variants, such as those seen in hyper-IgE syndrome, and skin barrier defects such as those caused by the *FLG* gene mutation in ichthyosis vulgaris, have a major role in determining whether a child will develop atopic dermatitis (Lyons et al., 2015). Atopic dermatitis can be classified into acute or chronic lesions depending on the condition of the affected skin and differences in cytokine expression (Park et al., 2013). Common symptoms during the acute stage include pruritic papules (itchy, small, solid raised bumps on the skin), erythema (redness of the skin), excoriations (wounds caused by picking or scratching the skin), and serous exudate (a common type of wound drainage) (Jakucs, 2024; National Cancer Institute, n.d.a; National Cancer Institute, n.d.b; Nelson, 2017; Park et al., 2013).

In acute AE Th2 cells produce cytokines such as IL-4, IL-5, and IL-13 (Jeskey et al., 2024). Chronic AD is characterized by Th2, Th1, Th22, and Th17 cells which cause epidermal thickening and abnormal keratinocyte proliferation (Jeskey et al., 2024). In childhood AD (2-12 years old) and adolescent AD (12-18 years old), lesions are considered chronic, presenting as thick, scaly plaques (small patches of tissue on a body part) with less exudate and erythema (Park et al., 2013). Both environmental and internal factors can trigger skin flare-ups in atopic dermatitis patients (Danby et al., 2022). Environmental factors include changes in temperature and humidity, dust mites, pollen, food allergies, and microbes; Internal factors include stress and hormones (Danby et al., 2022; Simpson et al., 2023).

The Relationship Between Eczema Severity and Comorbidity Onset

More severe eczema in children is associated with comorbidities, poorer overall health, and increased healthcare utilization compared to children with mild or moderate eczema (Silverberg & Simpson, 2013). For example, children with severe eczema have a higher prevalence of asthma, hay fever, and food allergies (Silverberg & Simpson, 2013). Further, eczema severity is directly associated with severity of comorbidities (Silverberg & Simpson, 2013). According to a 2013 study investigating the impact on eczema severity on the development of comorbid conditions among 91,642 children ages 0-17, severe eczema was associated with a higher prevalence of severe asthma (severe eczema vs. mild-moderate eczema 36.9% vs. 24.3%; $P=0.002$) and increased asthma severity (severe asthma: 36.1% vs. 5.5%; $P<0.0001$) (Silverberg & Simpson, 2013). The skin barrier is an important readout of interactions between genetics, the immune system, the cutaneous microbiome, and environmental exposures (Stefanovic & Irvine, 2024). Mutations in the *FLG* gene are a key genetic risk factor for the development and persistence of atopic dermatitis (Stefanovic & Irvine, 2024). In addition, aberrant type 2 inflammatory responses down-regulate the transcription of key epidermal barrier genes, alter skin lipids, and worsen the itch-scratch cycle, which can lead to additional skin damage and increased eczema severity (Stefanovic & Irvine, 2024). Epithelial barrier dysfunction allows allergens, irritants, and microbes to penetrate the skin, triggering type 2 immune responses (Leung et al., 2020).

Relationship Between Age and Comorbidity Onset

Atopic dermatitis usually begins early in life, with around 50% to 60% of cases developing within the first year (Hussien et al., 2026). A 2023 study investigating factors associated with adult-onset versus childhood-onset AD found that 90.8% of patients with infancy-onset AD suffered from atopic comorbidities (Maintz et al., 2023). The study also found that infancy-onset AD showed stronger associations with allergies than adult onset AD (Maintz et al., 2023).

Early onset AD is a stronger risk factor for asthma, allergic rhinitis, and food allergies than late-onset AD (Hussien et al., 2026). Atopic dermatitis is the start of the atopic march, a pattern in which atopic dermatitis starts during infancy and progresses to asthma or allergic rhinitis in children and adolescence, and can also lead to potential development of food allergy (Maiello et al., 2022).

Allergic, Psychological, and Metabolic Comorbidities Associated With Eczema

Eczema is associated with many allergic comorbidities such as food allergies, asthma, and hay fever (Miltner et al., 2024; Yoo & Perzanowski, 2014). Skin barrier dysfunction promotes systemic sensitization, in which IgE antibodies develop in response to allergens that enter the

body (Miltner et al., 2024; Yoo & Perzanowski, 2014). This occurs at a young age, which increases the likelihood of food allergies, asthma, and allergic rhinitis later in life (Miltner et al., 2024; Yoo & Perzanowski, 2014). In a 2024 study investigating the association between eczema phenotypes and other allergic comorbidities during childhood and adolescence, investigators found that children with a persistent eczema phenotype had a higher risk of developing food allergies, asthma and hay fever than children without eczema (Miltner et al., 2024).

Psychological comorbidities associated with eczema include depression, anxiety, sleep disturbances, suicide-related behaviors, autism spectrum disorder, and hyperactivity disorder (Zhu et al., 2026). The association between atopic dermatitis and psychological disorders is considered bidirectional, as chronic itching, visible lesions, and flare-ups in atopic dermatitis can contribute to stress, internalizing symptoms, and attentional impairment (Zhu et al., 2026). Conversely, psychological disorders can increase eczema severity by affecting immune activation, such as anxiety increasing Th2 polarization and allergic inflammation, and increasing the itch-scratch cycle (Zhu et al., 2026).

Metabolic comorbidities linked to eczema include metabolic syndrome, being overweight, obesity, dyslipidemia, and arterial hypertension (De Simoni et al., 2022). In a 2011 study investigating whether obesity in children or adolescents increases the risk of atopic dermatitis, results showed a statistically significant association between obesity and AD (OR 2.00; 95% CI: 1.22-3.26; $p = 0.006$) (De Simoni et al., 2022). This association between obesity and atopic dermatitis is multifactorial, as several metabolic alterations, increased oxidative stress, and a pro-inflammatory state are associated with pediatric obesity (De Simoni et al., 2022).

Conclusion

Atopic dermatitis usually begins early in life and has a major impact on a child's quality of life, as eczema is associated with many allergic, psychological, and metabolic comorbidities. Children with more severe eczema have a greater risk of developing comorbidities such as asthma, hay fever, and food allergies. Further, chronic itching, visible lesions, and flare-ups in atopic dermatitis can contribute to stress. Overall, recognizing these associations can improve understanding of the multisystemic effects of eczema on children. Additional research should be conducted to understand why children with eczema develop specific comorbidities and progress through the atopic march while others do not.

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