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Research Article

Serum IgE Levels and Clinical Severity of Childhood Eczema: A Cross-Sectional Study

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Abstract: ***Background:*** Childhood eczema, commonly referred to as atopic dermatitis (AD), is a chronic inflammatory skin disorder characterized by recurrent episodes of pruritus and eczematous lesions. Immunoglobulin E (IgE) plays a central role in allergic sensitization and has been implicated in disease pathogenesis. Elevated serum IgE levels have been associated with increased disease severity in several studies. ***Objective:*** To evaluate the association between serum IgE levels and clinical severity among children diagnosed with eczema. ***Methods:*** A cross-sectional study was conducted among 220 children diagnosed with eczema. Clinical evaluation included age, sex, disease duration, family history of atopy, associated allergic disorders, and disease severity assessment using the SCORAD index. Serum total IgE levels were measured and correlated with disease severity. ***Results:*** Elevated serum IgE levels were observed in 142 (64.5%) patients. Children with moderate-to-severe eczema demonstrated significantly higher serum IgE concentrations compared with those having mild disease. Higher IgE levels were significantly associated with increased SCORAD scores, recurrent disease episodes, family history of atopy, and concomitant allergic rhinitis or asthma. Multivariate analysis identified serum IgE >200 IU/mL, family history of atopy, and disease duration greater than two years as independent predictors of severe eczema. ***Conclusion:*** Serum IgE levels are significantly associated with clinical severity in childhood eczema. Elevated IgE concentrations may serve as a useful biomarker for identifying children at risk of more severe disease and recurrent exacerbations. Previous studies have demonstrated a positive correlation between serum IgE levels and SCORAD severity scores in pediatric atopic dermatitis.
Keywords: Atopic dermatitis, Childhood eczema, Immunoglobulin E, SCORAD, Atopy, Pediatric dermatology.

INTRODUCTION

Atopic dermatitis (AD), commonly known as eczema, is one of the most prevalent chronic inflammatory skin disorders affecting children worldwide. The disease is characterized by intense pruritus, recurrent eczematous lesions, xerosis, and a chronic relapsing course. The prevalence of childhood eczema has increased substantially over recent decades, making it a significant public health concern and a frequent cause of pediatric dermatology consultations [1,2].

The pathogenesis of eczema is multifactorial and involves a complex interaction among genetic predisposition, immune dysregulation, epidermal barrier dysfunction, and environmental triggers. Children with eczema frequently exhibit a personal or family history of atopic disorders including asthma, allergic rhinitis, and food allergies. The disease is increasingly recognized as part of the "atopic march," whereby allergic manifestations evolve throughout childhood [3,4].

Immunoglobulin E plays a fundamental role in allergic sensitization and immune responses. Elevated serum IgE concentrations are frequently observed in patients with atopic dermatitis and reflect activation of T-helper 2 immune pathways. Increased IgE production contributes to mast cell activation, inflammatory mediator release, and chronic skin inflammation [5]. Several studies have demonstrated that serum IgE levels tend to increase with disease severity and extent of skin involvement.

The SCORAD (SCORing Atopic Dermatitis) index is widely used to assess disease severity and combines objective clinical findings with subjective symptoms such as pruritus and sleep disturbance. Numerous investigators have attempted to identify laboratory markers that correlate with SCORAD scores and disease activity. Among these biomarkers, serum IgE has attracted considerable attention because of its potential role in predicting disease severity and long-term outcomes.

Previous studies have reported varying degrees of association between serum IgE levels and eczema severity. While some investigators observed strong positive correlations, others reported considerable variability among patients. Nevertheless, elevated IgE levels remain one of the most frequently reported laboratory abnormalities in severe atopic dermatitis.

The present study aimed to evaluate serum IgE levels and their association with clinical severity among children with eczema attending a tertiary care hospital.

METHODOLOGY

A hospital-based cross-sectional study was conducted in the Department of Pediatrics and Dermatology of a tertiary care teaching hospital. The study included children diagnosed with eczema. Institutional ethical approval was obtained before commencement of the study.

Children aged 1–16 years with clinically diagnosed atopic dermatitis according to Hanifin and Rajka diagnostic criteria were included. Patients receiving systemic immunosuppressive therapy, those with primary immunodeficiency disorders, parasitic infestations, or incomplete medical records were excluded.

Clinical data collected included age, sex, disease duration, family history of atopy, associated allergic disorders, frequency of exacerbations, and clinical severity. Disease severity was assessed using the SCORAD index and categorized as mild (<25), moderate (25–50), and severe (>50).

Venous blood samples were collected for measurement of serum total IgE levels using enzyme-linked immunosorbent assay. Serum IgE values greater than 200 IU/mL were considered elevated. Additional investigations including eosinophil counts were reviewed when available.

Statistical analysis was performed using SPSS version 22. Continuous variables were expressed as mean ± standard deviation while categorical variables were presented as frequencies and percentages. Student's t-test, Chi-square test, Pearson correlation analysis, and logistic regression were performed. Statistical significance was established at $p<0.05$.

RESULTS

Table 1. Demographic and Clinical Characteristics of Children with Eczema

Variable	Value
Mean Age (Years)	8.6 ± 3.4
Male	128 (58.2%)
Female	92 (41.8%)
Mean Disease Duration (Years)	3.1 ± 1.8
Family History of Atopy	98 (44.5%)
Allergic Rhinitis	72 (32.7%)
Bronchial Asthma	58 (26.4%)

The study population consisted predominantly of school-aged children with a slight male predominance. Nearly half reported a positive family history of atopic disorders.

The demographic profile reflects the typical epidemiological characteristics of childhood eczema. The high prevalence of associated allergic disorders supports the concept of eczema as part of the broader atopic disease spectrum.

Table 2. Serum IgE Status Among Study Participants

Serum IgE Category	Frequency (%)
Normal (<200 IU/mL)	78 (35.5%)
Elevated (200–1000 IU/mL)	104 (47.3%)
Markedly Elevated (>1000 IU/mL)	38 (17.2%)
Total	**220 (100.0%)**

Elevated serum IgE levels were observed in nearly two-thirds of participants.

The majority of children with eczema demonstrated elevated IgE concentrations, indicating substantial allergic sensitization. Markedly elevated IgE levels were observed in a significant subgroup and were frequently associated with more extensive disease.

Table 3. Relationship Between Serum IgE Levels and Disease Severity

Variable	Mild Eczema	Moderate Eczema	Severe Eczema	p-value
Mean IgE (IU/mL)	164 ± 82	486 ± 212	1284 ± 534	<0.001
Mean SCORAD Score	18.4 ± 4.1	37.6 ± 6.2	63.8 ± 8.4	<0.001
Family History of Atopy (%)	28.8	47.4	68.2	<0.001
Asthma (%)	12.5	24.6	47.7	<0.001

Serum IgE levels increased progressively with increasing disease severity.

Children with severe eczema demonstrated significantly higher IgE concentrations than those with mild disease. The progressive rise in IgE levels across severity categories suggests a strong relationship between allergic sensitization and disease activity.

Table 4. Independent Predictors of Severe Eczema

Variable	Odds Ratio (OR)	95% Confidence Interval (CI)	p-value
Serum IgE >200 IU/mL	4.26	2.01–9.02	<0.001
Family History of Atopy	2.87	1.39–5.91	0.004
Disease Duration >2 Years	2.64	1.28–5.46	0.008
Bronchial Asthma	2.21	1.03–4.75	0.041
Male Gender	1.18	0.58–2.39	0.645

Elevated serum IgE emerged as the strongest independent predictor of severe eczema.

The regression model demonstrated that elevated IgE levels significantly increased the likelihood of severe disease. Family history of atopy and prolonged disease duration also independently contributed to greater disease severity.

DISCUSSION

The present study demonstrated a significant association between serum IgE levels and clinical severity of childhood eczema. Nearly two-thirds of children exhibited elevated IgE concentrations, and serum IgE levels increased progressively with increasing disease severity.

The high prevalence of elevated IgE observed in this study is consistent with the immunopathogenesis of atopic dermatitis. IgE-mediated immune responses play a critical role in allergic sensitization and chronic skin inflammation. Elevated serum IgE is a characteristic feature of the extrinsic form of atopic dermatitis and is frequently associated with more extensive disease [5,6].

A major finding of this study was the strong positive relationship between serum IgE levels and SCORAD severity scores. Similar findings were reported by Laske et al., who demonstrated a significant correlation between serum IgE levels and disease severity in children with atopic dermatitis.

Our findings also agree with the observations of Dhar et al., who reported significant covariance between disease severity and serum IgE levels. Their study demonstrated that increasing IgE concentrations were associated with more severe eczema manifestations and recurrent disease activity.

Family history of atopy was significantly associated with severe disease in the present study. Genetic predisposition plays an important role in eczema pathogenesis, and children with a positive family history frequently exhibit earlier disease onset and greater disease severity [7].

Children with severe eczema demonstrated a higher prevalence of concomitant asthma and allergic rhinitis. This finding supports the concept of the atopic march and highlights the close relationship among various allergic disorders. Similar associations have been reported in epidemiological studies evaluating childhood atopic diseases [8].

The marked elevation of serum IgE observed in severe cases may reflect persistent allergen exposure and ongoing immune activation. Previous studies have shown that patients with extremely high IgE levels often experience more persistent disease and poorer long-term outcomes.

Although serum IgE demonstrated a significant association with disease severity, variability among patients was also observed. Some children with moderate disease exhibited relatively low IgE concentrations, indicating that additional immunological and environmental factors contribute to disease expression. Similar observations have been reported in previous studies.

The findings suggest that serum IgE measurement may provide useful adjunctive information during clinical assessment. While IgE alone should not be used as the sole indicator of disease severity, elevated levels may help identify children at increased risk of severe or persistent disease.

CONCLUSION

Serum IgE levels are significantly associated with clinical severity in childhood eczema. Children with severe disease demonstrate substantially higher serum IgE concentrations compared with those having mild disease.

Elevated serum IgE, family history of atopy, prolonged disease duration, and associated allergic disorders were important predictors of severe eczema. Routine assessment of serum IgE levels may assist clinicians in evaluating disease burden and identifying high-risk pediatric patients who require closer follow-up and comprehensive management.

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