



## Research Article

**CORRELATION OF THE SEVERITY OF ATOPIC DERMATITIS WITH ABSOLUTE EOSINOPHIL COUNT IN PERIPHERAL BLOOD AND SERUM IgE LEVELS**

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## ARTICLE INFO

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## ABSTRACT

**Background:** Atopic dermatitis (AD) is a common inflammatory skin condition with a relapsing and remitting course<sup>1</sup> that affects all ages but is more common in children. AD prevalence is high in developed and high-income countries which is nearly 10-30% in children and 2-10% in adults, it also shows that there is a 2-3-fold increase in prevalence over the past few decades.<sup>2</sup> The increased serum IgE levels and the absolute eosinophil count shows correlation with AD severity.<sup>4</sup> **Methods:** A prospective descriptive study was conducted in DVL department, Government General Hospital, Kurnool Medical College, Kurnool with a sample size of 50 patients. **Results:** AD was common in age groups of 0-1 year (22%) and 1-5years (56%) with a Male: Female ratio of 1.38:1 of which 44% belonged to middle and 38% to lower socio-economic status. Family history and personal history of atopy were noted in 58% and 68% of the cases respectively. Pruritus was seen in 100% of cases and xerosis in 96% of cases. **Conclusions:** Elevated AEC and serum IgE levels were noted in 74% and 82% respectively. Mean AEC and Mean serum IgE levels showed correlation with the severity of the disease.

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## INTRODUCTION

Atopic dermatitis (AD) is a skin disease with a relapsing and remitting course.<sup>1</sup> It is an inflammatory skin disease which usually presents in infancy, childhood and to a lesser extent in adulthood and elderly. Atopic dermatitis is a common inflammatory skin condition that affects all ages but is more common in children. The disease is more common in children with a family and/or personal H/o atopy and also in higher socioeconomic status and urban population.<sup>2</sup> AD prevalence is high in developed and high-income countries which is nearly 10-30% in children and 2-10% in adults, it also shows that there is a 2-3-fold increase in prevalence over the past few decades.<sup>2</sup> The disease is characterised by intense pruritus and it is considered as an important major criterion in AD diagnosis.

The etiopathogenesis of AD includes complex interaction between multiple factors like immune dysregulation, triggers, hygiene hypothesis and genetic susceptibility resulting in an impaired skin barrier function and microbial colonization.<sup>4</sup> The disease is associated with increased levels of serum IgE in majority of the patients with an increased risk of anaphylaxis and a decreased susceptibility to delayed hypersensitivity. The increased serum IgE levels and the absolute eosinophil count shows correlation with AD severity.<sup>3</sup> The clinical diagnostic criteria of atopic dermatitis is introduced by Hanifin and Rajka's which includes four major features and 23 minor features. Then in 1994, UK working party criteria was

proposed. There are no universally established criteria for the diagnosis of atopic dermatitis till now.<sup>3</sup> This study was done to know the severity of atopic dermatitis and to establish its correlation with the serum IgE levels and AEC count.

## MATERIALS AND METHODS

A prospective descriptive study was conducted for eighteen months in DVL department, Government General Hospital, Kurnool Medical College, Kurnool.

**Sample size** – Total of 50 patients

**Inclusion criteria**

1. Children aged between 0 month to 15 years presented with features of atopic dermatitis and who were clinically diagnosed by Hanifin and Rajka's criteria
2. Children with their guardians accepting for the willingness to the study

**Exclusion criteria**

1. Children with their guardians not willing for the study
2. Children of AD with any associated congenital skin disorder, immunocompromised disorder and drug rash
3. Children of AD with other systemic diseases
4. Children with contact dermatitis, infective eczema, parasitic infestations, hyper IgE syndrome

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- Patients on systemic corticosteroids and immunosuppressants

**COLLECTION OF DATA**

50 cases of clinically diagnosed atopic dermatitis were enrolled for the study after taking a detailed informed, written consent from guardians.

- A detailed history was taken for each patient regarding duration, age of onset, family, personal history of atopy, food allergies, seasonal variation and triggering factors.
- A thorough general examination and cutaneous examination was done and the morphology, distribution of the cutaneous lesions, associated cutaneous findings were noted. The AD severity was calculated by SCORAD system and the patients were graded into mild disease (SCORAD 0-25), moderate disease (SCORAD 26-50), severe disease (SCORAD >50). Systemic examination was done for all the patients.
- Investigations**

- Complete blood picture - Haemoglobin, Total Count, Differential Count, Peripheral Blood Smear
- Absolute eosinophil count (AEC) – Venous EDTA blood was collected and sent for automated analyser for AEC which is then confirmed by peripheral smear.
- Serum IgE level – 2ml of blood is drawn and serum IgE is measured by chemiluminescent immunoassay (CLIA).

Normal serum IgE levels according to age – in IU/ml (Newborn < 1.5 IU/ml, infants < 15 IU/ml, 1 – 5 years < 60 IU/ml, 6 – 9 years < 90 IU/ml, 10 -15 years < 200 IU/ml, above 15years < 100 IU/ml).

- Urine routine
- Stool examination for ova and cysts

**STATISTICAL METHODS**

Statistical analysis will be carried out utilizing R software. P values < 0.05 were considered statistically significant. All outcomes will be presented using descriptive statistics; normally distributed data by the mean and standard deviation (SD) and skewed distributions by the median and interquartile range (IQR). Binary and categorical variables will be presented using counts and percentages. Statistical test used are t - test, chi-square test, Fisher exact test and Anova test.

**RESULTS**

Out of the 50 patients, 11 patients (22%) were in the age group of 0-1 year, 28 patients (56%) were in the age group of 1-5 years, 9 patients (18%) were in the age group of 5-10 years, 2 patients (4%) were in the age group of 10 -15years, 58% (29 patients) were males, 42% (21 patients) were females (Table 1), 44% belonged to middle class, 38% to lower class and 18% to upper class, 56% were from urban area, 44% from rural area, 76% had seasonal variation (winter exacerbation in 60%, Summer exacerbation in 16%) and 24% had no seasonal variation.

**Table 1** Sex Distribution in Study Population

Sex	P=0.18	
	Number of Cases	Percentage (%)
Male	29	58
Female	21	42



**Figure 1:** lesions over face

- a) Dry eczematous plaque over cheek,
- b) Eczematous plaque over cheek

In this study, the distribution of cutaneous lesions was predominantly over face in 76% followed by upper limb in 48%, lower limb in 42%, flexural in 32%, extensors in 30%, trunk in 22%, seborrheic areas in 10% and generalized involvement in 6%. Out of 50 patients, 54% had mild disease, 42% had moderate disease and 4% had severe disease (Table 2), 58% had H/o atopy in the family and 68% had personal H/o atopy.

**Table 2** Severity of Disease in Study Population

Severity of Disease	Cases (n) = 50	
	P=0.04(S)	
	Number of Cases	Percentage (%)
Mild	27	54
Moderate	21	42
Severe	2	4



**Figure 2** Flexor Distributions of Lesions in Childhood

- a) Flexor distribution – antecubital fossa
- b) Eczematous plaques over antecubital fossa
- c) Flexor distribution - popliteal fossa
- d) Chronic eczema over popliteal fossa

Out of 50 patients, all of them had pruritus (100%), distribution and morphology typical for the disease in 98%,

chronic or relapsing disease course in 82% and family and/or personal H/o atopy in 90% (Table 3) and 96% had xerosis, 2% had orbital darkening, 30% had ichthyosis, hyperlinearity of palms and soles, keratosis pilaris, 68% had early age of onset, 82% had raised serum IgE, 52% had tendency towards cutaneous infections, 6% had facial pallor, 2% had anterior neck folds, 10% had intolerance to wool, lipid solvents, 20% had food intolerance, 2% had nipple eczema, 10% had cheilitis, 4% had dennie morgan fold, 6% had recurrent conjunctivitis, 20% had nonspecific hand and/or foot eczema, 26% had pityriasis alba, 28% had itch when sweating, 2% had perifollicular accentuation and 30% had course influenced by environmental, emotional factors (Table 4).

**Table 3** Distribution of Major Criteria in Study Cases

Major criteria	Cases (n) = 50		
	Number of Cases	Percentage (%)	Statistics
Pruritus	50	100	-
Typical morphology, distribution	49	98	P=<0.01 (S)
Chronic or relapsing disease course	41	82	P=<0.01(S)
Family and/or personal H/o atopy	45	90	P=<0.01(S)



**Figure 3** lesions over extensors

- a) Discoid eczema
- b) Xerosis over extensors of legs

**Table 4** Distribution of Minor Criteria in Study Cases

Minor Criteria	Cases (n) = 50		
	No of Cases	% of cases	Statistics
Xerosis	48	96%	P=<0.01(S)
Orbital darkening	1	2%	P=<0.01(S)
Ichthyosis, Hyper linearity of palms and soles, keratosis pilaris	15	30%	P=0.04(S)
Earlier age at onset	34	68%	P=<0.01(S)
Raised serum IgE	41	82%	P=<0.01(S)
Increased risk for cutaneous infections	26	52%	P=<0.01(S)
Facial pallor	3	6%	P=<0.01(S)
Anterior neck folds	1	2%	P=<0.01(S)
Lipid solvents and wool intolerance	5	10%	P=<0.01(S)
Food intolerance	10	20%	P=<0.01(S)
Nipple eczema	1	2%	P=<0.01(S)
Cheilitis	5	10%	P=<0.01(S)
Cataract	0	0%	P=<0.01(S)
Dennie Morgan fold	2	4%	P=<0.01(S)
Recurrent conjunctivitis	3	6%	P=<0.01(S)
Non-specific hand and/or foot eczema	10	20%	P=<0.01(S)
Pityriasis alba	13	26%	P=<0.01(S)
Itch when sweating	14	28%	P=<0.01(S)
Perifollicular accentuation	1	2%	P=<0.01(S)
Course influenced by environmental and emotional factors	15	30%	P=0.04(S)



**Figure 4** severe ad with acute eczematous lesions

- a) Eczematous plaques over periorbital and perioral areas
- b) Acute eczematous plaque with oozing and secondary bacterial infection
- c) Acute eczematous plaques
- d) Acute eczematous plaques over buttocks
- e) Eczematous plaques

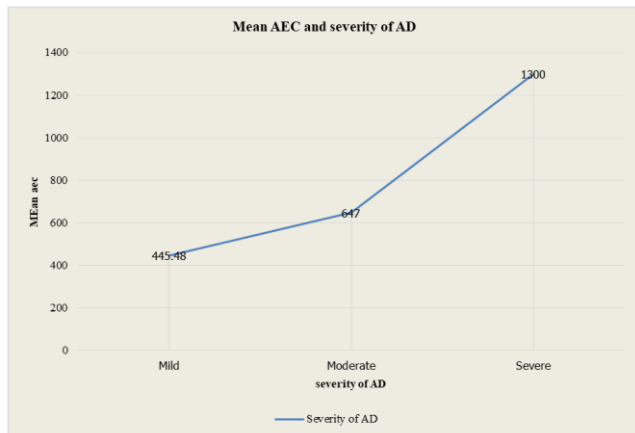
Out of 50 patients AEC was elevated (>400 cells/cumm) in 74% cases with mean AEC value in mild disease was 445.48 cells/cumm, moderate disease was 647 cells/cumm and 1300 cells/cumm in severe disease (Table 5, figure 5). Out of 50 patients, 82% had elevated serum IgE level with mean serum IgE value in mild disease is 337.53 IU/ml, 656.41 IU/ml in moderate disease and 946 IU/ml in severe disease (Table 6, Figure 6).

**Table 5** Aec Level and Severity of Disease in Study Cases

Severity of AD	AEC Levels			P-value
	Number of cases	Mean	Std. Deviation	
Mild	27	445.48	108.447	<0.01
Moderate	21	647	262.283	
Severe	2	1300	28.284	

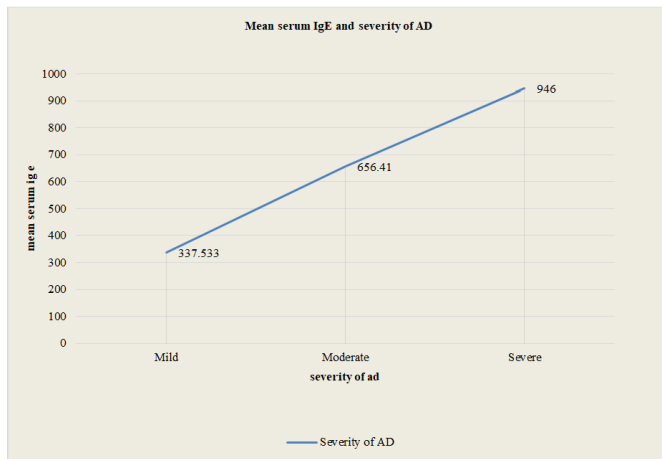
**Table 6** Serum Ige Level and Severity of Disease in Study Cases

Severity of AD	Serum IgE			P-Value
	Number of Cases	Mean	Std. Deviation	
Mild	27	337.533	275.5764	0.01
Moderate	21	656.41	579.7002	
Severe	2	946	28.2843	



Mean AEC value in mild disease was 445.48 cells/cumm, moderate disease was 647 cells/cumm and 1300 cells/cumm in severe disease.

**Figure 5** Aec Level and Severity of Disease in Study Cases



Mean serum IgE value in mild disease is 337.53 IU/ml, 656.41 IU/ml in moderate disease and 946 IU/ml in severe disease.

**Figure 6** Serum IgE level and severity of disease in study cases

**DISCUSSION**

This prospective descriptive study was conducted among patients attending the department of DVL at Government general hospital, Kurnool. This study was done to know the severity of atopic dermatitis and to establish its correlation with the serum IgE levels and AEC count. The study was conducted for eighteen months with a Sample size of 50 patients.

Out of 50 patients, 11 patients (22%) in 0-1 year, 28 patients (56%) in 1-5 years, 9 patients (18%) in 5-10 years, 2 patients (4%) in 10 -15years which were comparable with the studies

conducted by Sehgal V N et al<sup>5</sup> which shows 15% of patients in 0-1 year, 53% in 1-5 years, 11% in 5-10 years and 10-15 years each, 58% (29 patients) were males, 42% (21 patients) were females which was comparable with 57% males and 43% females in Dhar S et al<sup>6</sup> study, 44% belonged to middle class, 18% to upper class and 38% to lower class which was closely comparable with 19.2% of cases belonged to upper class, 57.5% to middle class and 23.2% to lower class in Sarkar R et al<sup>7</sup> study, 56% were from urban area, 44% from rural area which was closely comparable with 53% from urban region and 47% from rural region in Dhar S et al study<sup>8</sup>, 76% had seasonal variation. winter exacerbation was seen in 60% and Summer exacerbation in 16% which was closely comparable with the studies conducted by Sarkar R et al<sup>7</sup> showing 62% winter and 17% summer exacerbation respectively. Out of 50 patients, 54% had mild disease, 42% had moderate disease and 4% had severe disease which was comparable to the studies conducted by Dhar S et al<sup>6</sup> 2002 showing mild disease in 54%, moderate disease in 27% and severe disease in 19%, the distribution of cutaneous lesions were predominantly over face in 76% followed by upper limb in 48%, lower limb in 42%, flexural in 32%, extensors in 30%, trunk in 22%, seborrheic areas in 10% and generalized involvement in 6% which is closely similar to the findings in the study conducted by Dhar S et al<sup>8</sup> (face in 74.5%, flexural in 35.5% and extensors in 56.32%).

In the present study all 50 patients (100%) had pruritus which was closely comparable with 100% presence of pruritus in Yazganoglu et al<sup>9</sup> study, 49 patients (98%) had distribution and morphology of the lesions typical for the disease which was closely similar to the study conducted by Yazganoglu et al<sup>9</sup> (99.7%). In this study 41 patients (82%) had history of Chronic or relapsing course of the disease which was comparable with the study conducted by Kumar MK et al<sup>10</sup> (82%) and 68% of patients had personal H/o atopy and 58% had family H/o atopy which was closely comparable with the study conducted by Dhar S et al<sup>6</sup> 2002 (54% and 65%)

Out of 50 patients, xerosis was noted in 96% of patients which was closely comparable with the study conducted by Bohme M et al<sup>11</sup> (100%), 15 patients (30%) showed Hyperlinearity of palms, IV or KP which was closely comparable with study conducted by Yazganoglu et al<sup>9</sup> (29.7%), 34 patients (68%) had earlier age at onset of the disease which was comparable with study conducted by Yazganoglu et al<sup>9</sup> (72.9%), 26 patients (52%) showed increased risk for cutaneous infections which was comparable to a lesser extent with study conducted by Wahab MA et al<sup>12</sup> (80%),

In this study, intolerance to wool was present in 10% of the cases which was less comparable with the study conducted by Bohme M et al<sup>11</sup> (<25%), food intolerance was noted in 20% of the patients which was closely comparable to the studies conducted by Wahab MA et al<sup>12</sup> (19%), itch when sweating was noted in 28% of patients which was closely comparable with the study conducted by Wahab MA et al<sup>12</sup> (26.7%), Nipple eczema was noted in 2% of the cases which was closely comparable with the study conducted by Yazganoglu et al<sup>9</sup> (5.3%). Cheilitis was noted in 10% of the cases which was closely comparable with the study conducted by Wahab MA et al<sup>12</sup> (10.5%), Hand and/or foot eczema was noted in 20% of the cases which was closely comparable with the study conducted by Wahab MA et al<sup>12</sup> (16.6%), Pityriasis alba

was noted in 26% of the cases which was closely comparable with the study conducted by Bohme M et al<sup>11</sup> (<25%), Periorbital hyperpigmentation was noted in 2% of the cases which was less comparable with the studies conducted by Bohme M et al<sup>11</sup> (<25%) and Yazganoglu et al<sup>9</sup> (35.6%). Recurrent conjunctivitis was noted in 6% of the cases which was less comparable with the studies conducted by Yazganoglu et al<sup>9</sup> (12%) and Bohme M et al<sup>11</sup> (<25%). Dennie-Morgan fold was noted in 4% of the cases which was less comparable with the studies conducted by Bohme M et al<sup>11</sup> (<25%), Yazganoglu et al<sup>9</sup> (63.8%) and Wahab MA et al<sup>12</sup> (39.5%). There were no cases with cataract noted which was less comparable with the study conducted by Yazganoglu et al<sup>9</sup> (1.1%).

Out of 50 patients, course influenced by environmental and emotional factors was noted in 30% of the cases which was closely comparable with the study conducted by Yazganoglu et al<sup>9</sup> (35%), Perifollicular accentuation was noted in 2% of the cases which was less comparable with the study conducted by Yazganoglu et al<sup>9</sup> (9.5%), facial pallor was noted in 6% of the cases which was closely comparable with the study conducted by Yazganoglu et al<sup>9</sup> (3.7%), anterior neck folds were noted in 2% of the cases which was less comparable with the study conducted by Yazganoglu et al<sup>9</sup> (25.3%).

## CONCLUSIONS

AD was common in age groups of 0-1 year (22%) and 1-5years (56%) with a Male: Female ratio of 1.38:1 of which 44% belonged to middle and 38% to lower socio-economic status and 56% and 44% were from urban and rural areas respectively. Family history of atopy was noted in 58% and personal history of atopy in 68% of the cases. Pruritus was seen in 100% of cases and xerosis in 96% of cases. Elevated AEC and serum IgE levels were noted in 74% and 82% respectively. Mean AEC (mild AD - 445.48, moderate AD - 647 and severe AD - 1300 cells /mm<sup>3</sup>) and Mean serum IgE (mild AD - 337.533, moderate AD - 656.41 and severe AD - 946 IU/ml) levels were measured and they showed correlation with the severity of the disease.

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