Clinico-immunological correlation of atopic dermatitis in a Tertiary Care Center in Karnataka

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Abstract

Atopic dermatitis (AD) is an itchy, chronic or chronically relapsing inflammatory skin condition. The total serum Immunoglobulin E (IgE) level is elevated in over 80% of AD patients and there is a positive correlation with the extent and severity of the disease. Aim of the study is to study the level of serum IgE in Atopic dermatitis with reference to age and sex of the patient and to correlate serum IgE level with severity of the disease. A total of 100 cases of AD were studied for a period of 18 months. All cases were evaluated with detailed history and cutaneous examination to determine the sites of involvement, morphology and severity of the disease (SCORAD Index). Serum IgE level was estimated. Prevalence of AD was 0.58%. 49% of patients were in the age group of 0-1 year. Male:Female ratio was 1.3:1. Personal and family history of atopy were noted in 66% and 56% of cases respectively. Total serum IgE level was elevated in 84% of cases (MeanIgE = 618.5250±529.66546), males had higher mean IgE level (499.8718±572.52684) compared to females (292.1488±399.45628) and age group 10-15 years had higher mean IgE level (681.6125±375.66684). AD cases with mild and moderate severity had mean IgE level of 219.5377±325.10135 and 781.3412±607.10195 respectively. To conclude Serum IgE is elevated in majority of the cases (84%) and the total serum IgE levels correlate with severity of disease. Thus it can be recommended that total serum IgE level estimation before and after treatment of AD may serve as a prognostic factor.

Keywords: Atopic dermatitis, Immunological profile, SCORAD Index, Serum IgE,

Introduction

Atopic dermatitis(AD) is highly pruritic inflammatory skin disease that results from complex interaction between genetic susceptibility genes resulting in defective skin barrier, defects in the innate immune system and heightened immunological responses to allergens and microbial agents.[1] A rising trend in AD has been observed in India also in last four decades. Changes in environmental pollutants, breast feeding pattern, increased

awareness and urbanization are some of the reasons cited for this change.[2]

Hanifin and Rajka for the first time proposed a systematic approach towards the standardization of the diagnosis of AD by incorporating four major/basic and 23 minor features, of which elevation of serum IgE is one of the minor criteria.[3]

In Europe, the European Task Force on Atopic Dermatitis has developed and evaluated a composite severity index based on a broad consensus by dermatologists. The resulting SCORAD index consisted of information on the extent, the intensity and subjective symptoms. The objective SCORAD is a scoring system based on the assessment of extent and intensity in a standardized manner. The complete system is called SCORAD index. The extent (A) of lesions is determined by applying the rule of nine after drawing the lesions on an evaluation form. The intensity (B) is determined by grading each of the 6 items on a scale from 0 to 3 (erythema, edema/papulation, oozing/crusts, excoriation, lichenification and dryness) and also includes the assessment of subjective symptoms (C) (pruritus, sleep loss) on a visual analogue scale. Finally the total score is the sum of Extent/5+ 7 x Intensity/2 + Subjective symptoms (A/5 +7 x B/2 + C). Total score is 103. Depending on the calculated score of individual patient, severity of disease can be graded as Mild (score less than 25), Moderate (25-50) and Severe (more than 50).[4]

In this study we have used Hanifin and Rajka's criteria for clinical diagnosis and SCORAD index for assessing severity of atopic dermatitis in the study patients.

The main immunoglobulin abnormality in AD is increased production of IgE. This results in the presence of many antigen-specific IgE species to ingested or inhaled antigens and frequently, an increase in total serum IgE. Normal value for serum IgE is considered to be less than 200 IU/ml. Total serum IgE levels are raised in 80% and are normal in 20% of AD patients.[5] The amounts of IgG, IgA and IgM in AD are usually normal, but increased levels have been reported particularly in severely affected persons.[6]

Many studies show elevation of Serum IgE levels in Atopic dermatitis, but there are only few studies that evaluate correlation between Serum IgE and severity of the disease. This clinico-immunological study is intended to study serum IgE levels in Atopic dermatitis with reference to age and sex of the patient and to correlate serum IgE level with severity of the atopic dermatitis in southern part of India.

Material and methods

A prospective, descriptive study was conducted over a period of eighteen months from January 2014 to June 2015 after approval from ethical committee. The study included 100 atopic dermatitis patients attending the Out Patient Department of Dermatology in South Indian teaching Hospital.

Inclusion criteria: Clinically diagnosed cases of Atopic dermatitis according to Hanifin and Rajka's criteria.

Exclusion criteria: Patients with Contact dermatitis, Stasis eczema, Lichen Simplex Chronicus, Infective eczema.

Statistical tools: Analysis was done by using Mean, Standard Deviation, Independent sample 't' test, ANOVA test, Multiple correlation test and Tetrachoric correlation. Analysis of Data by using Statistical software.

After noting the demographic data, a detailed history was taken with reference to the age of onset and its duration, triggering factors, family and personal history of atopy. After taking informed written consent from patients and parents of the patient(in case of minor), a detailed cutaneous examination was done to determine the sites of involvement, morphology and severity of the disease

(using the SCORAD Index). A thorough general physical examination and systemic examination was done.

Blood samples were collected from all enrolled patients for total serum IgE levels. Each serum sample was subjected to total IgE measurement using a commercially available kit (Immulite ®, Seimens Healthcare Diagnostic Products, UK) as per manufacturer's protocol. This test was based on sandwich ELISA technique.

Normal reference IgE level according to age as per the IgE kit:

< 1month -   < 1.2 IU/ml

1-6months - < 7.2 IU/ml

7-12months - < 12.7 IU/ml

1-5years -   < 60 IU/ml

6-9years -   < 155 IU/ml

10-15years - < 199 IU/ml

Adults -   < 100 IU/ml

Results and Discussion

A total of 95,727 cases attended the Out Patient Department of Dermatology during the study period (January 2014- June 2015), of which 562 cases were AD contributing to the prevalence of 0.58%.

Out of 100 patients, 84% of patients had elevated serum IgE levels and there was no elevation of serum IgE levels in 16% of patients (Table 1).

Elevation of serum IgE level was seen in 100% of patients in the age group of 10 to 15 years and 15 to 20 years, 87.75% in 0 to 1 year age group, 86.9% in 1 to 5 year age group, 80% in 20 to 40 years age group, 62.5% in 40 years or more age group, 57.1% in 5 to 10 years age group (Table 2).

Mean IgE level in age group 0-5years was 543.6712, in age group 5-10 years was 355.6571, 10-15 years age group had 681.6125, 15-20 years age group had 557.8400 and 20-25 years age group had 275.4388, >25 years age group had 478.936 (Table 3).

Out of 57 males in study group, 92.9%(53) of patients showed elevated serum IgE levels and out of 43 females in the study group, 72.1% (31) of patients showed elevated serum IgE levels with mean IgE levels of 499.8718 and 292.1488 in males and females respectively (Table 4).

In 67% of patients, AD was mild in severity and 33% of patients had moderate severity of AD. However, none of the patients in our study had severe AD.

Mean IgE level in patients with mild disease was 219.5377 IU/ml and in patients with moderate disease was 781.3412 IU/ml (Table 5).

The present study is an attempt to evaluate serum IgE level with reference to age and sex of the patient and to correlate serum IgE level with severity of the atopic dermatitis

In present study, 84% of patients showed elevated serum IgE levels ranging from 2.4 to >2000 IU/ml with a mean IgE= 212.38 IU/ml. These results are comparable with the results of various studies conducted by Chottopadhyay SP et al[7] (84%), Somani VK et al[8] (88%) and Johansson SG et al[9] (80%) but varied from the observations of the study done by Yazganoglu et al[10] (57.5%). Increased IgE level in AD patients is a known features in approximately more than 70-80% of individuals. Hence, in majority of studies >80% of patients have shown increased level of IgE on par with the present study.

Mean IgE level was more in the age group 10-15years (681.6125 IU/ml), followed by 15-20 years age group which showed mean IgE level of 557.84 IU/ml, 0-5 years age group had mean IgE level of 543.6712 IU/ml, above 25 years age group had 478.9363 IU/ml, 5-10 years age group had 355.6571 IU/ml. Most results of present study in correlation of IgE levels with different age groups were comparable to the study done by Somani VK et al[8], where patients in the age group of 10-15 years had highest level of mean IgE (836 IU/ml) which could be due to

environmental factors, psychological stress and food habits.

Out of 57 males in the study group, 92.1%(53) patients showed elevated serum IgE levels with Mean IgE 499.8718 IU/ml and out of 43 females, 72.9%(31) patients showed elevated serum IgE levels with mean IgE 291.1488 IU/ml. Study done by Spalding et al[11] also showed that mean IgE among males (78.5 IU/ml) was more compared to mean IgE among females (30.2 IU/ml), a finding which was similar to our study. Similar results were noticed in an another study done by Weber MB et al[12], where he compared median IgE among males and females and found raised median IgE among males. This can be attributed that males are more susceptible for AD and they mount strong allergic response

In our study, mean IgE level among Moderate AD cases (781.3412IU/ml) was more compared to mild AD cases (219.5377 IU/ml). Similar results were noticed in a study done by Kumar MK et al[13] in Bihar where mild, moderate and severe AD cases had mean serum IgE level of 389.28IU/ml, 831.37 IU/ml and 1269.8 IU/ml respectively. Whereas an another study done in Brazil by Weber MB et al[12] showed mean IgE level of 279 IU/ml in mild AD cases, 347 IU/ml in moderate AD cases and 952 IU/ml in severe AD cases, which showed that rise in IgE level was proportionate to the severity of the disease indicating more the severity of the disease, more is the elevation of IgE level. Thus IgE levels correlates with severity of the disease.

Table 1: Elevation of serum IgE level

Serum IgE	χ^2=46.240, P=0.000(S) Independent 't'test, P=0.000(S) Cases (n) = 100			
	Number of Cases	Percentage (%)	Mean Serum IgE IU/ml	Std deviation
Elevated	84	84	478.0666	349.0546
Not Elevated	16	16	56.0930	147.9536
Total	**100**	**100**		

Table 2: Elevation of serum IgE levels among different age groups.

Age group	Serum IgE P=0.296			
	Elevated	Percentage (%)	Not elevated	Percentage (%)
0 to 1 Year	43	87.75	6	12.25
1 to 5 Years	20	86.9	3	13.1
5 to 10 Years	4	57.1	3	42.9
10 to 15 Years	3	100	0	0
15 to 20 Years	5	100	0	0
20 to 40 Years	4	80	1	20
40 Years or more	5	62.5	3	37.5
Total	**84**		**16**	

Table 3 : Mean serum IgE levels among different age groups

Age group	ANOVA, P=0.144
	Mean IgE (IU/ml)
0 to 5 Year	543.6712
5 to 10 Years	355.6571
10 to 15 Years	681.6125
15 to 20 Years	557.8400
20 to 25 Years	275.4388
>25 Years	478.9363

Table 4 : Elevation of serum IgE levels and mean serum IgE level among Males and Females

Sex	Serum IgE				Independent 't' test, P=0.045	
	Elevated	Percentage (%)	Not Elevated	Percentage (%)	Mean IgE IU/ml	Std. Deviation
Male (57)	53	92.9	4	7.1	499.8718	572.52684
Female (43)	31	72.1	12	27.9	292.1488	399.45628
Total	**84**		**16**			

Table 5: Severity of disease and Mean IgE in the study group

	Severity of disease	Mean IgE IU/ml	Std. Deviation Independent 't'test, P=0.000(S)
IGE LEVEL	Mild	219.5377	325.10135
	Moderate	781.3412	607.10195

Conclusion

In our study, serum IgE was elevated in majority of the cases (84%), males had higher serum IgE level, the age group10-15years had the highest mean IgE levels and the

total serum IgE levels correlate with severity of disease. Thus it can be recommended that total serum IgE level estimation before and after treatment of AD may serve as a prognostic factor.

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