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Serum IgE Concentration in Infantile Atopic Dermatitis

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The serum IgE concentration was determined in 34 infants under 1 year of age with infantile atopic eczema. Serum IgE levels varied from lower than 10unit/ml to 900 unit/ml, being lower than 100unit/ml in 30 cases. There was no relationship between the presence of the atopic family history and serum IgE values of babies, but a few of patients with more extensive skin changes had high IgE values. In babies over 4 months of age there was observed a tendency for the serum IgE level to rise, but the rate of increase in the IgE level was mild as compared with that in the children with atopic dermatitis over 1 year of age.

INTRODUCTION

It is a well-known fact that the elevated serum IgE values are observed in severe cases of atopic dermatitis.⁴⁾⁻⁷⁾⁹⁾¹¹⁾ However, it still remains obscure to what extent IgE antibody is involved in the pathogenesis of atopic dermatitis.

Although serum IgE level parallels the extent and severity of skin lesions in atopic dermatitis, no variations in the IgE level are seen even when the change of severity occurs naturally or by treatment. This suggests that skin manifestations might not influence the production of IgE antibody directly. Furthermore, there are no systematic studies to investigate the variations in serum IgE values before the onset of dermatitis and after complete disappearance of it. Thus, we selected the infants under one year of age with infantile atopic dermatitis as a clinical model to study the fluctuations in serum IgE values before and after the onset of skin lesions. The reason is that the relationship between serum IgE and skin lesions could possibly be examined in the early stage of this disease since the skin lesions differ from those of typical atopic dermatitis and have a tendency to heal by various treatment.

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MATERIALS AND METHODS

Capillary blood samples were collected from 34 babies with infantile atopic dermatitis, and at -20°C until analyzed. These babies had no concurrent atopic diseases, i.e. asthma and/or allergic rhinitis. Serum samples were taken for one to six weeks to examine the fluctuation of the serum IgE level in 11 babies.

Ten μl of serum were mixed with 90 μl of saline to make a 10 fold dilution and the measurement was made by the radioimmunosorbent technique (RIST).

Since values of IgE concentration did not distribute in Gaussian manner, all values have been transformed logarithmically to the base of 10 before calculation.

RESULTS

Clinical data for each baby and serum IgE levels are presented in Table 1. The serum IgE levels varied from lower than 10unit/ml to 900unit/ml. Four babies (12%) had higher levels than 100unit/ml, while six cases had lower values than 10unit/ml.

The geometric mean value was 16.8unit/ml up to 3 months of age, 84.6unit/ml at 4–6months, 59.6unit/ml at 7–9months and 25.4unit/ml at 10–12 months ; babies showed lower values until 3 months of age. (Fig 1)

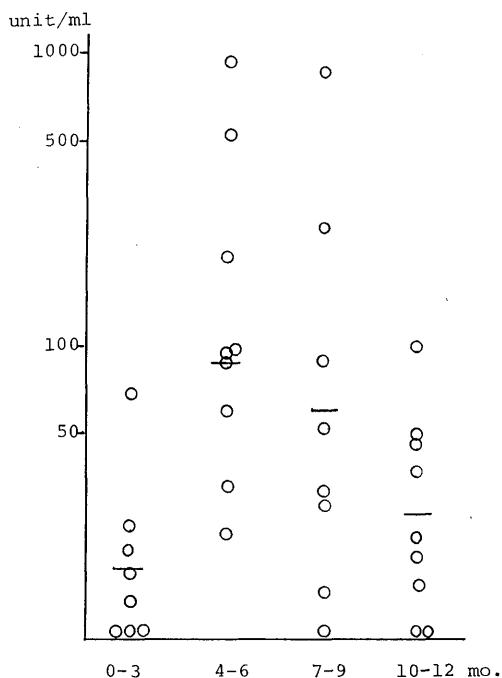


Fig. 1. Age group distribution of serum IgE concentrations

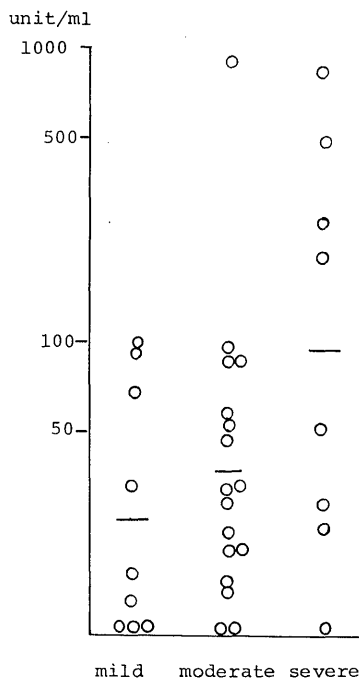


Fig. 2. Correlation between serum IgE levels of patients and severity of dermatitis

Table 1. Serum IgE level of 34 babies and clinical factors

Case No	Age (mo)	Sex	Onset	Family History	IgE level (unit/ml)	Eosinophil Count/mm ³	Severity
1	1	F	3W	-	<10	2100	mild
2	1	F	2W	-	<10	188	mild
3	1	M	1W	+	<10	2071	mild
4	2	M	<1	-	13.3	124	mild
5	3	F		-	67.1	1378	mild
6	3	F		-	16.0	400	mild
7	3	M	2	-	22.6	1364	sever
8	3	M	2	+	19.0	250	moderate
9	4	F	3	-	90.2		mild
10	4	M	3	-	58.3	840	moderate
11	4	F	1	-	22.0	158	moderate
12	4	M	1	-	31.9	363	moderate
13	5	F	4	-	85.3	582	moderate
14	5	F	3		22.0		moderate
15	5	M	3		93.9	600	moderate
16	6	F	<1	-	28.1	366	severe
17	6	M	6	-	194.7	268	severe
18	6	M	2	-	495	2528	severe
19	6	M	5	+	900		moderate
20	7	M	1	+	820	107	severe
21	7	M	1	-	13.8	0	moderate
22	7	M		+	52.3	440	moderate
23	7	M	4	-	250	1287	severe
24	8	M	6	-	88.0	165	moderate
25	8	M	5	+	32.5	152	mild
26	8	F	6	-	<10		moderate
27	9	M	7	-	37.4	240	moderate
28	10	M	5	+	15.0	82	moderate
29	11	M	10	-	98.5	560	mild
30	11	M		-	19.0	128	moderate
31	11	F	<1	+	46.8	2480	moderate
32	11	M	11	-	51.7	270	severe
33	11	M	9	+	<10	340	severe
34	11	M	11	+	<10	168	moderate

In order to examine the relationship between the severity of skin lesions and serum IgE values, the severity of dermatitis was classified as follows for comparison of serum IgE values in various groups. That is, the case is defined as mild where there is only exudative erythema localized mainly in the face, as moderate where there is a mild degree of dryness and roughness over the entire cutaneous surface and as severe where lichenoid plaques develop over the flexural areas of the arms and legs sporadically or at many places.

The mean serum IgE value of the mild group was 25.2 unit/ml ; that of moderate group, 36.8unit/ml ; and that of severe group, 94.7unit/ml. Serum levels greater than 100 unit/ml were found in 3 of 7 patients (38%) with severe, 1 of 17 with moderate

(6%), and in no babies with mild dermatitis (Fig. 2).

There was no clear relationship between other clinical factors such as the age of onset of illness, duration of skin lesions, blood eosinophile counts, the presence of the atopic family history and serum IgE values.

The IgE values were followed from the initial examination to one or four weeks in 11 babies. The IgE values rose slightly in seven out of 10 cases and remained unchanged or tended to decrease in three cases; however, no relationship between the change of skin lesions and serum IgE values (Fig. 3).

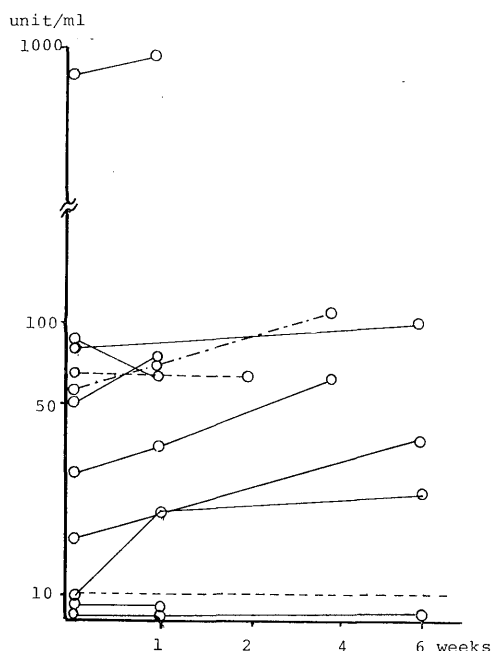


Fig. 3. Serum IgE variation in 11 babies with infantile eczema

DISCUSSION

Variations in the serum IgE value of healthy babies after the birth have been studied by a few investigators,⁽¹⁾⁽²⁾⁽⁵⁾⁽⁷⁾⁽⁸⁾ but their results are controversial. Berg and Johansson⁽²⁾ and Johansson⁽⁵⁾ reported that the mean IgE value is 60 ng/ml in babies at less than 3 months of age, 72 ng at 6 months and 114 ng at 9 months, and reaches the adult value at 7 years of age. Since the very low concentration of IgE was detected in cord sera and newborn children, and no correlation between mother and cord blood IgE levels was seen, it is suggested that IgE might be produced by fetus or newborn child.⁽¹⁾⁽⁵⁾⁽¹⁰⁾

Bazaraal et al⁽¹⁾ described that the mean IgE level of babies aged six weeks is 5.5 unit/ml and no synthesis of IgE was apparent in the serum of one-third of the 6-week-old infants and that all 6-month-old infants had measurable IgE levels averaged 57.6 unit/ml.

Our results showed that the IgE value was low until 3 months of age but in infants aged 4 months or more increases the number of cases with high IgE value. Orgel et al.⁽⁸⁾ reported that the significant rise in IgE is observed at 3 and 9 months of age in infants including babies with atopic diseases. These findings suggest that the development of atopic disease could be in parallel with the variation of serum IgE level in the babies over 3 months of age.

While there are many reports that the serum IgE value is correlated with the severity

and extent of skin lesion in atopic dermatitis, a similar tendency was observed in infantile atopic eczema from our results. However, the increase in the IgE levels is mild even in severe cases in which lichenoid plaques develop extensively; the value more than 100unit/ml is found only 4 (44%) of 9 cases. The rate of increase in serum IgE is small as compared with that in atopic dermatitis after infancy. This gives rise to two hypotheses; one is that IgE is not produced enough in infants because of the premature of IgE producing mechanism, and the other is that the IgE production is not easily induced because skin lesions in babies are different in character from that after infancy. Further studies are required for clarifying this problem.

Bazaraal et al.¹⁾ confirmed that the mean IgE value of babies with the atopic family history was 98.6unit/ml and those without it 29.6unit/ml; the high IgE values were obtained in the infants with the positive family history. Orgel et al.⁸⁾ obtained the similar result and maintained that the genetic effects are presumably of major importance since, by 1 year of age, a significant correlation is seen between infant and mean parental IgE levels. However, our finding did not show such a correlation. The cause of this discrepancy is probably that the babies with only atopic dermatitis were selected in our study.

In our time course study in 11 children, serum IgE values were almost stable in spite of improvement of skin lesion by treatment. In adults with atopic dermatitis, the similar tendency is observed, when the variation was monitored.⁷⁾ Therefore, even at babies under 1 year of age, serum IgE level seems to be stable once it rises.

One of our main purposes was to obtain the correlation between the onset of skin lesions and the variation of serum IgE levels. The study by Orgel et al.⁸⁾ is the only one aimed at elucidating this relationship. They measured the serum IgE levels for one to two years after birth in 34 infants from atopic and nonatopic families. The time and the rate of increase varied from infant to infant, but the median IgE value are generally increased with the age in month and showed a rapid increase particularly at 3 and 9 months. Interestingly, 12 babies who had 20 unit/ml or more in the first year of life developed definite atopy in 8 cases and possible atopy in the remaining 4 cases by the second year of life, and the elevation of serum IgE value preceded the manifestation of atopy in 11 out of 12 cases.

Hence, the measurement of the serum IgE value within one year of life will provide important findings in foreseeing the onset of atopic disease.

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