

Assessment of Serum Interleukin-4 and Immunoglobulin E Levels in Pityriasis Alba Patients

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Abstract

Background: Role of IL-4 and Ig-E in aetiopathogenesis of pityriasis alba (PA) is questionable.

Aim: To assess the serum IL-4 and Ig-E levels in pityriasis alba patients.

Patients & Methods: Thirty patients with pityriasis alba (group I) (n=30) and thirty volunteers (group II) completed the study (n=30). IL-4 and Ig-E were measured in patients' sera with enzyme linked immune sorbent assay (ELISA).

Results: There was statistically significant correlation between IL-4 and PA which points to the role of Th2 and IL-4 in pathogenesis of PA. There was no statistical significance between Ig-E and either PA or IL-4 level.

Conclusion: Imbalance of IL-4 level may play a critical role in pathogenesis of PA. Changed balance of IL-4 level may be related to the genetic background of patients, and adds more evidence to the association of PA and atopic dermatitis.

Introduction

Pityriasis alba (PA) is a skin disorder that presents with asymptomatic, ill-defined, slightly scaling patches with variable hypo-pigmentation [1]. Although its etiology is not well established, several factors are implicated including infection (*Pityrosporum*, *Streptococcus*, *Aspergillus* and *Staphylococcus*), nutritional deficiencies, atopy and dry skin, environmental factors (such as variations in temperature and air humidity, altitude and excessive exposure to sun) but none has been confirmed [2].

Interleukin-4 (IL-4) is a cytokine that has a role in differentiation of naive helper T cells (Th0 cells) to Th2 cells. Afterwards, Th2 cells produce more IL-4 when activated by IL-4. Other studies pointed that basophils may also induce Th0 differentiation through production of IL-4 [3].

Aggregation of antigens and binding of Ig-E to the FcεRI on mast cells causes degranulation and the release of mediators from the cells, while basophils cross-linked with Ig-E release type 2 cytokines like interleukin-4 (IL-4), interleukin-13 (IL-13) and other inflammatory mediators [4].

Given the fact that PA can occur in association with Atopic dermatitis (AD) and as IL-4 plays an important role in the pathogenesis of AD, we were interested in determining serum IL-4 in pityriasis alba patients, as well as estimating the Ig-E level in these patients.

Patients and Methods

Patients

The study was carried out in dermatology outpatient clinic, Suez Canal University Hospital in accordance with the guidelines of the Helsinki Declaration, and was performed after obtaining the informed consent from all parents of the children. This study was carried out as descriptive comparative study for a period of 1 year on 30 pityriasis alba patients (group I), their age ranged from 3 to 16 years, 30 normal volunteer; who were gender- and age-matched with the patients served as a control group (group II)

The inclusion criteria were as follow:

- 1- Gender: male or female.
- 2- Age: 3-18 years.
- 3- Patient with recent or old disease.
- 4- Not or stop receiving topical or systemic treatment one month ago.

The exclusion criteria were as follow:

- 1- Patient with other skin diseases.
- 2- Patient with other systemic diseases.
- 3- Patient receiving topical or systemic treatment.

Methods

All of the studied patients were subjected to the following: Full history-taking, general and syste-

mic examination with special emphasis on personal history and family history of allergic diseases had been taken from all patients. Serum levels of IL-4 and Ig-E were measured in all subjects by ELISA.

Statistical Analysis

Statistical analysis was performed using the program SPSS version 15 (SPSS Inc, Chicago, IL). Quantitative data were expressed as means ± SD while qualitative data were expressed as numbers and percentages (%). Student t test were used to test significance of difference for quantitative variables that follow normal distribution and Chi Square were used to test significance of difference for qualitative variables. A probability value (p-value) < 0.05 were considered statistically significant.

Results

Demography: The age of group (I) ranged from 3 to 16 years, with the majority (49%) of patients between 10 to 16 years, while the minority (3%) of patients from 3-5 years [graph (1)]. The group (I) included 19 (63%) males and 11 (37%) females. The male to female ratio was 1.73:1. Family history of AD was positive in 27% and family history of PA was positive in 23% in group (I)

Level of Ig-E in group (I) was high in 14 patients (46.7%), borderline in 14 (46.7%), while normal Ig-E level was found in 2 (6.7%) patients. On the other hand, Ig-E level in group (II) was high in 5 (17%) patients, borderline level in 13 (43%) patients, while 12 (40%) had normal IgE level.

Level of IL-4 in group (I) was high in 19 (63.3%), while normal IL-4 level were found in 11(36.7%) patients. On the other hand, IL-4 level in group (II) was high in 18 (60%) pa-

Table 1. Distribution of the Group (I) and Group (II) According to the Results of Ig-E

Ig-E	Group (I)		Group (II)	
	No.	%	No.	%
Normal <20	2	6.7	12	40
Borderline 20-100	14	46.7	13	43.3
High >100	14	46.7	5	16.7
Total	30	100	30	100
IL-4	Group (I)		Group (II)	
	No.	%	No.	%
High	19	63.3	18	60
Normal	11	36.7	12	40
Total	30	100	30	100

tients, while 12 (40%) had normal IL-4 level (Table 1).

By comparing the IgE and IL-4 levels between both groups, it was found that both of them was statistically significant higher in group (I) than in group (II) as shown in (Table 2). However, there was no relation between IgE and IL-4 levels (Table 3).

Patients in group (I) were assigned into two subgroups, those with and without family history of AD. Level of Ig-E and IL-4 in patients with and without family history of AD shows that there were statistically significant difference in IL-4 and no statistical significance in Ig-E level in relation to group with family history (Table 4). Ig-E level was none statistically significant in patients having family history of PA, but IL-4 level was statistically significant in patients having family history of PA (Table 5).

Discussion

The peak of incidence of pityriasis alba is coincident with the age when children begin to do more outdoor activities. This leads to the possible influence of sun exposure on the development of P. alba. Moreover, the typical location of lesions is one of the main characteristics of P. alba. Usually, they are detected in exposed areas, and this may have an aesthetic impact [2, 5].

In our study, almost half of the patients (49%) were in the age group 10-16 years and this ag-

Table 2. Comparison between level of Ig-E and IL-4 in group (I) and group (II)

	Group (I)		Group (II)		T	P
	Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD		
Ig-E Iu/ml	228.26 ± 276.14	76.76 ± 125.13	2.73	0.008*		
IL-4 Pg/ml	62.53 ± 15.72	33.13 ± 21.92	1.22	0.009*		

rees with other authors, as PA occurs mainly in children aged 3-16 years [6].

This study shows male tendency of PA (63%). And this agrees with the results of other researches who found that PA is more prevalent in male children between the ages of 3 and 16 years [7].

Pityriasis alba is more prevalent in cold weather, this can be explained on the basis of increased skin dryness in winter. It is considered as one of the minor manifestations of atopy, although atopic symptoms are often not evident by the time PA appears. However, it is expected that those patients with PA will have AD later in their life [8]. And this agrees with this study, as atopic background was present in 27% patients, and 23% of patients have positive family history of P. alba. Meanwhile, the results of our study revealed a statistically significant increase in IL-4 levels in PA patients compared with the control. IL-4 has an important role in Th2 differentiation and the pathogenesis of AD.

In this study family history of AD and PA were significantly correlated to Ig-E. This can be explained by enhanced Th2 cell producing more IL-4 that may be related to genetic background, heredity and parasitic infection.

Table 3. Relation Between Ig-E Level and IL-4 in the Group (I)

Ig-E Iu/ml	IL-4 Pg/ml				P-Value
	Normal (n: 11)		High (n: 19)		
	N	%	N	%	
Normal	1	9.1%	1	5.2%	0.46
Borderline	4	36.4%	10	52.6%	
High	6	54.5%	8	42.2%	

Table 4. Comparison Between Level of Ig-E and IL-4 in Group (I) with and without Family History of AD

	With family history		Without family history		U	P
	Mean ± SD	N	Mean ± SD	N		
Ig-E Iu/ml	211.25 ± 256.04	8	197.5 ± 251.66	22	68.5	0.35
IL-4 Pg/ml	50.12 ± 16.16	8	37.36 ± 14.27	22	35.0	0.012

Table 5. Comparison Between Level of Ig-E and IL-4 in Group (I) with and without Family History of Pityriasis Alba

	With family history		Without family history		U	P
	Mean ± SD	N	Mean ± SD	N		
Ig-E Iu/ml	195.71 ± 146.3	7	190.43 ± 252.26	23	70.00	0.60
IL-4 Pg/ml	42.57 ± 14.32	7	36.95 ± 10.67	23	34.00	0.02

The relation between Ig-E and IL-4 was non statistically significantly correlated in PA, so both are independent on each other and not necessary to be elevated together, so we approved the role of Th2 and IL-4 in PA and excluded the role of Ig-E in etiopathogenesis of PA.

Conclusion

Imbalance of IL-4 level may play a critical role in pathogenesis of PA. Changed balance of IL-4 level may be related to the genetic background of patients, which need more study. However; no relation between Ig-E and IL-4 level in PA patients.

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