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Atopic dermatitis and psoriasis as overlapping syndromes.

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Abstract

Background: Concomitant atopic dermatitis (AD) and psoriasis (PS) are not common. However, both diseases are still of interest because of their comprehensive and diverse mechanism. The aim of the study was to present the clinical and immunological profile of patients with concomitant AD and PS coexist in comparison to patients with one of these diseases.

Methods: In this observational study, 38 children with concomitant AD and PS with a mean age of 6.5 ± 3.2 yrs. were compared with similar 41 patients with only AD (5.3± 5.1 yrs) and with 28 with PS (6.4± 4.3 yrs). All patients underwent the dermatological examination including SCORAD and PASI questionnaire. TNF-α, IFN-γ, Il-2, Il-4, Il-5, Il-6, Il-8, Il-12, I-17, Il-18, Il-22, Il-33, TARC/CCL17 were measured by the use ELISA method and according manufacturer (ThermoFischer Scientific, US).

Results: Patients with concomitant AD and PS were frequently boys or with overweight and with a proportional area distribution of skin lesions. A positive family history of atopic disease was more frequently reported by children with concomitant AD and PS, and with AD vs. PS. Significant differences were observed in the concentration of Il-17 in patients with AD and PS compared with that in AD or PS patients as follows: 9.1±3.7 pg/ml vs. 4.8±2.9 pg/ml and 5.2±3.9 pg/ml (PD vs. AD, p = 0.01; PD vs. PS, p = 0.03).

Conclusion: AD and PS might coexist as overlapping disease. The role of T-helper 17 may be more meaningful than it appeared.

1. Background

Atopic dermatitis (AD) and psoriasis (PS) are inflammatory skin disorders but clinically different. However in the young population PS is commonly mistaken with AD (1). AD affects 11%-30% of children and PS applies 1%-3% of them (2). AD has the form of erythematous patches with excoriations associated with pruritus. PS presents with well-demarcated plaques covered with silvery white scales (1,3). AD and PS despite of differences, have some common paths as infiltration of immune cells in the skin, transformed expression of some proinflammatory cytokines and changes in barrier alterations (2,4). Although the pathogenesis of PS and AD are different, PS has been found to be associated with atopy and AD. However, PS can show eczematous changes in the acute exacerbation, while AD can display psoriasiform lichenified changes in the persistent-resistant stage. Both of them can be misinterpreted as the coexistence of two diseases.

The are evidence that AD and PS can co-exist as overlapping syndrome: psoriasis-dermatitis (1). This condition has various hypotheses of origin (5,6)

The aim of the study was to assess clinical characteristics and cytokine profile in children with AD and concomitant PS in comparison to those with AD or PS.

2. Methods

It was prospective, observational, two center study. This study included 38 children with a mean age of 6.5 ± 3.2 yrs with concomitant AD and PS. They were compared with similar 41 patients with only AD (5.3± 5.1 yrs) and with 28 with PS (6.4± 4.3 yrs).

Patients will be eligible if they have received a diagnosis of AD and/or PS are aged 5 years to below 10 years, have mild-to-severe AD symptoms according to the objective SCORing Atopic Dermatitis (SCORAD) Index or/and mild-to severe PS according to the objective PASI, and observation was at least 12 months .

The diagnosis of AD was based on the patient's clinical features and historical characteristics because there is no objective test to confirm a diagnosis of this disease. In this study we based on The UK working group to establish diagnostic criteria for diagnosis of AD. In this way, AD was diagnosed when a child has an itchy skin condition and minimum three of the following criteria: 1. visible flexural dermatitis involving the skin creases, such as the bends of the elbows or behind the knees (or visible dermatitis on the checks and/or extensor areas in children aged 18 months or under), 2. a personal history of flexural dermatitis) or dermatitis on the checks and/or extensor areas in children aged 18 months or under), 3. a personal history of dry skin in the last year, 4. a personal history of asthma or allergic rhinitis (or history of atopic disease in a first-degree relative of children aged under 4 years of age), 5. onset of signs and symptoms under the age of 2 years (this criterion should not be used in children aged under 4 years) (1,7)

PS was confirmed based on typical morphology (well-demarcated psoriatic plaques, guttate disease, acral fingertip eruptions, napkin or pustular psoriasis) and history (1,8,9).

Patients with both diagnosis AD and concomitant PS were observed minimum 12 months to confirm it. There were three independent dermatological assessment before this overlapping condition was diagnosed.

The exclusion criteria are as follows: oral administration of corticosteroids, immunosuppressants prior to study entry, active skin diseases without AD and or PS, other chronic diseases, lack of the written consent.

The protocol of study

All patients underwent the following procedures: full dermatological examination including SCORAD and PASI questionnaire (despite of inclusion criteria), collected a blood sample to analyse cytokine. TNF-α, IFN-γ, Il-2, Il-4, Il-5, Il-6, Il-8, Il-12, I-17, Il-18, Il-22, Il-33, TARC/CCL17 were measured by the use ELISA method and according manufacturer (ThermoFischer Scientific, US).

Statistical analysis

Statistical analysis was using Statistica 8.2 (SaftPOl, Krakow, Poland). *ANOVA, Wilcoxon test nad t-Student* teste were performed to compare relevant variables. A p-value < 0.05 was considered significant.

3. Results

The characteristic of the groups were presented in table no 1. Patients with concomitant AD and PS were frequently boys or patients with overweight and with a proportional area distribution of skin lesions. A positive family history of atopic disease was more frequently reported by children with concomitant AD and PS, and with AD vs. PS

Table no 1. Characteristics of studied groups.

	AD&PS n = 38	AD n = 41	PS n = 28
mean age (yrs)	6.5 ± 3.2	5.3± 5.1	6.4± 4.3
girl (%)	13 (34)^	23 (56)	18 (64)
other atopic disease	3 (8)	8 (20)*	0
BA (%)	6 (16)	17 (41)*	6 (21)
AR (%)			
family history	6 (15)	18 (43)^^	4 (14)
ADEA (%)	11 (29)	2 (5)#	7 (25)
PS (%)			
area of affected	11 (29)	15 (24)	11 (39)
skin:	10 (26)	15 (36)	8 (29)
head	9 (24)	13 (31)	9 (32)
arms	14 (37)	8 (19)**	11 (39)
legs	9 (24)	14 (34)	9 (32)
trunk			
nails			
SCORAD	35±8	42±11	-
PASI	28 ±10	-	34±9
BMI > 23	14 (37)^^	5 (12)	7 (25)
confirmed arthritis	4(11)	4 (10)	5 (19)

Legend: AD&PS - *psoriatic dermatitis, ADEA – atopic diseases, PS- psoriasis, BA – allergic bronchial asthma, AR -allergic rhinitis, SCORAD – scoring atopic dermatitis scale, PASI- Psoriasis Area and Severity Index; ; ^ - significant domination of male in AD&PS vs. AD and vs. PS (Wilcoxon test, p < 0.05); * - more frequent BA and AR in AD vs AD&PS and vs PS (p < 0.05); ^^ more frequent atopic diseases in family history in patient with AD in comparison to AD&PS and PS (p < 0.05); # - less frequent PS in family history in patients with AD in comparison other groups (p < 0.05); ** - less frequently affected skin of trunk in patients with AD (p = 0,05);^^ - patients with overweight dominated in the AD&PS (p < 0.05).*

Cytokine profile

Significant high serum concentration of Il-17 in patients with concomitant AD and PS and Il-22 in patients with AD in comparison to other group were observed. The results of cytokine profile determinations were shown in table no 2.

Table no 2. The distribution of levels of tested cytokines in blood serum (values are the mean ± SD)

	AD&PS n = 38	AD n = 41	PS n = 28
TNF-α (pg/mL)	18.9±10.2	13.9±9.2	14±6.9
IFN-γ (IU/mL)	0.45±0.13	0.38±0.11	0.56±0.29
Il-2 (pg/mL)	39.2±1*3.*6	44.5±14.9	41.8±9.5
Il-4 (pg/mL)	51.7±33.2	56±28.1	34.9±10.3^
Il-5 (pg/mL)	187±96	219±102	75±45^
Il-6 (pg/mL)	11.9±7.2	9.4±4.2	8.9±3.3
Il-8 (pg/mL)	28.8±10.3	22.8±11.6	25.2±8.4
Il-12 (pg/mL)	32.1±12.7	29±10.3	27.8±12
Il-17 (pg/mL)	10.1±3.7*	4.8±2.9	5.2±3.9
Il-18 (pg/mL)	67.4±21.3	70.1±22.9	66.4±18.3
Il-22 (pg/mL)	678±262	1394±341**	542.4±210
Il-33 (pg/mL)	89.7±24.7	102±64.1	78±43.7
TARC/CCL17	145±62	195±87	132±42

Legend: AD&PS - *psoriatic dermatitis, ADEA – atopic diseases, PS- psoriasis ^ - lower mean serum concentration in patients with PS compared with AD&PS and AD (Student's t-test, p < 0.05); * - higher mean serum concentration in patients with AD&PS compared with AD and PS (p < 0.05); **- higher mean serum concentration in patients with AD compared with AD&PS and PS (p < 0.05)*

4. Discussion

Concomitant AD and PS is not common, and there is little information about the clinical course of interference of these diseases. The coexistence of these disease in the same person may be due to at least three scenarios: 1. concurrence and flare -up at the same time point period, which is truly rare; 2. concurrence at the same period of life time, when one flares up, the other subsides, or vice versa, which can be occasionally observed; 3. occurrence at different life stages, such as atopic dermatitis in childhood, then remitted for years, development of psoriasis later in adulthood. This is probably the most common scenario. In the presented study group of patients with comorbid AD and PS there were patients mainly corresponding to 1 and sometimes 2 scenario variant. It is this is similar to other few such observations (5,6).

The obtained result revealed clinical and immunological differences between analysed groups.

The pathophysiology of AD and PS is complex. In the first, the defect of the epidermal barrier function is crucial; however, many secondary mechanisms are observed. Dysfunction of the skin barrier increases the penetration of allergens and microorganisms into the skin. These antigens induce immunological responses, for example, by the use of T-helper 2 and T-helper 22 cells and proinflammatory cytokines, in the acute phase. This leads to skin inflammation. Then, during the progression of AD a role of the T-helper 1 pathway is also possible (10,11). Keratinocyte dysfunction is of major importance in the pathomechanism of psoriasis. T-helper 1 overactivation induces psoriasis; however, T-helper 17 cells have been demonstrated to be critical for this disease. T-helper 17 cells produce cytokines, which affect keratinocyte proliferation and stimulate inflammation (12,13). The obtained results indicate that Il-17 and therefore the participation of T helper 17 may be especially crucial in concomitant AD with PS. However, in the group with psoriasis the Il-17 values were significantly lower despite evidence of the important role of Th17 in this disease (10,11). Perhaps this is due to too small a group or a mild form of the disease in the PS group. However, in this group the lower level of Il-4 and Il-5 and Il-22 can confirm different mechanisms of diseases compared with the other group analysed. The cytokine profile of AD confirms the known mechanism of this disease (14). The relatively new biomarkers of AD as Il-33 and TARC although they were elevated in the group with concomitant AD with PS and AD groups compared to PS, they were not significant differences. These results may indicate a large variety in the scope of AD and PS endotypes, which is currently being studied (15)

Patients with concomitant AD and PS and PS and AD had a similar distribution of the affected skin areas. The results of this study are largely consistent with the observations of other authors (5). However, important clinical information is that boys and overweight patients are more likely to suffer from concomitant AD and PS. This last information is slightly different than obtained by Docampo where overweigh were more presented in patients with PS (5). These results are influenced by many factors: group selection, size of the study group, environmental conditions, eating habits. The open question is about obesity as a risk factor for concomitant AD and PS. This requires testing on a larger group of patients. Domination of male was consistent with the other observations given (5,6).

There are some limitations of the study: relatively small studied group (but similar with other observations), lack of biopsias and only 12 months observation. Unfortunately due to ethical problem it was impossible to perform biopsias in very young children. However, a few examined children underwent biopsies of skin lesions and the value of the histopathological examination was not different from the clinical assessment of these patients. These data were not published due to their small number.

5. Conclusion

We agree with the hypothesis of other authors that AD and psoriasis might exist across a disease spectrum, resulting in overlapping disease characteristics. The role of T-helper 17 may be more meaningful than it appeared.

Abbreviations

BA – allergic bronchial asthma,

AD - atopic dermatitis

AD&PS - psoriatic dermatitis,

ADEA – atopic diseases

AR -allergic rhinitis

IgE - immunoglobulin E

PASI- Psoriasis Area and Severity Index;

PS - psoriasis

SCORAD – scoring atopic dermatitis scale

Declarations

Ethics approval and consent to participate:

The study was approved by the local ethics committees of the Medical University of Silesia in Poland. All patients including all parents of children, signed an informed consent form.

Consent for publication:

n/a

Availability of data and materials:

All data used to support the findings of this study, including patient records, may be released upon request from the Clinical Department of Internal Disease, Dermatology and Allergology email: sekretariat.dermatologia@klinika-zabrze.med.pl

Competing interests:

there are no competing interests

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Authors' contributions:

AB – conception, statistical analysis, MZ – analysis, writing, MK – data collection, analysis

All authors read and approved the final manuscript

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