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Difference of IL-4, IFN-γ in serum and LTE4 in urine between young and middle-aged patients with eczema and normal volunteers and its clinical significance.

Duan Baoxue[1*], Wu Dandan[2], Sun Fang[3], Xu Xin[4]

[1]Department of Dermatology, Xiangyang No. 1 People's Hospital Affiliated with Hubei University of Medicine, Xiangyang, PR China

[2]Department of Dermatology, Kaifeng No.2 People's Hospital, Kaifeng, PR China

[3]Department of Dermatology, Zhangjiagang Aoyang Hospital, Zhangjiagang, PR China

[4]Department of Dermatology, Danyang Center for Disease Control and Prevention, Danyang, PR China

Abstract

Objective: To explore the difference of IL-4, IFN-γ in serum and LTE4 in urine between young and middle-aged patients with eczema and normal volunteers and its clinical significance.
Methods: We selected 84 cases of young and middle-aged patients with eczema treated in our hospital from April 2013 to April 2015. In control group, 50 cases of healthy volunteers who came for medical examination in our hospital in the same period were selected. IL-4, IFN-γ in serum and LTE4 in urine in both groups were detected.
Results: IL-4, IFN-γ in serum and LTE4 in urine in patients with eczema were significantly higher than that in control group ($p<0.05$). The difference of IL-4, IFN-γ and LTE4 levels among different grades of eczema were significant ($p<0.05$). The levels were the highest in acute eczema patients, and lowest in chronic eczema patients. There was no significant difference of albumin, erythrocyte sedimentation rate, serum creatinine, globulin, platelets and lymphocytes between eczema group and control group ($p>0.05$).
Conclusion: IL-4, IFN-γ in serum and LTE4 in urine in young and middle-aged patients with eczema significantly increase along with the degree of illness, indicating that IL-4, IFN-γ in serum and LTE4 in urine might be involved in pathogenesis of eczema.

Keywords: Eczema, IL-4, IFN-γ, LTE4.

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Introduction

Eczema, the pathogenesis of which is still not clear, is a common form of skin disease. The clinical manifestations of eczema are various. There may also be a recurrent and chronic process [1-4]. Since eczema can cause some damage to the skin of the patient, it brings great impact to the life of patients. Eczema is an allergic inflammatory skin disease caused by multiple factors. It is type IV allergy, mainly T cell-mediated immune injury. Studies [5-8] have found that endogenous factors of eczema were mostly atopic factors related to inheritance. While exogenous factors were mainly the outside stimuli such as patient's life and work environment. Studies have shown [9] that leukotrienes involved in pathogenesis process of chronic urticaria and atopic dermatitis. In this study, we analysed the expression of IL-4, IFN-γ in serum and Leukotriene E4 (LTE4) in urine in patients with eczema and its clinical significance.

Materials and Methods

The clinical data

84 cases of young and middle-aged patients with eczema during April 2013~April 2015 in our hospital were selected, with 45 cases of male and 39 cases of female. The ages were between 18~60, with average of (36.42 ± 10.21 y). In the 84 cases of patients, there were 27 patients with acute eczema, 34 with subacute eczema, and 23 with chronic eczema. In control group, 50 cases of healthy volunteers who came for medical examination in our hospital in the same period were selected. There were 26 cases of male and 24 cases of female, with age between 18~58 and (38.24 ± 12.05) in average. By comparison, distribution of baseline data such as age and sex was consistent ($p>0.05$), which was comparable.

Diagnostic criteria

Referring to relevant diagnostic criteria in "Clinical Dermatology" by James et al. [10]. a) Acute eczema: With acute exacerbation in patients, it can occur in any part of the body, or restricted to a particular place, with symmetrical distribution, mostly in flakes. The boundary is not clear, with a slight swelling of the affected place, with pimples, redness or blisters mainly. It is often accompanied by intense itching and significant leakage can cause scab and erosion when scratching. b) Subacute eczema: With relived acute inflammatory lesions, scaly skin lesions, incrustation and papules mainly, there are a few parts appearing small blisters or erosion. It can also occur with mild infiltration, and remain severe itching. c) Chronic eczema: Due to recurrent acute or subacute eczema without recovery, thus transformed into chronic eczema. It may also be chronic eczema of the onset. Lesions are limited to one or multiple, with hyperpigmentation, infiltration hypertrophy, rough surface, and a small amount of moss or small scaly lesions, simultaneously there may be pimples scattered. Patients have significant itching and often-paroxysmal attacks.

Inclusion criteria and exclusion criteria

Inclusion criteria: a) meet the diagnostic criteria; b) between the ages of 18 to 60 y old; c) no family history, no clear incentive; d) no family history of asthma, eczema infants or allergic rhinitis; e) signed informed consent.

Exclusion criteria: a) received corticosteroid hormone therapy or immunosuppressive therapy two weeks before entering the group, or used oral antihistamine drugs within three days before entering the group; b) fungal infection on skin; c) severe liver and kidney dysfunction; d) pregnant and lactating women; e) combined with other serious primary diseases.

Method

5 ml venous blood of each subject was drawn in early morning. After placing at room temperature for half an hour, it was centrifuged for 5 min at 2000 rpm. After serum was collected, it was stored in refrigerator at -30°C for test. Using Enzyme-Linked Immunosorbent Assay (ELISA), Interleukin-4 (IL-4) and Interferon-γ (IFN-γ) levels in peripheral blood of patients were tested. IL-4 and IFN-γ kit were purchased from Jingmei Biochemical Limited. The operation was in accordance with the instructions.

8 ml urine specimens from each in early morning was collected and put into frozen pipe in the -70°C refrigerator to be tested. Urinary leukotriene E4 (LTE4) level was detected using ELISA. LTE4 kit was purchased from Yuji Biological Engineering Co., Ltd. The operation was in accordance with the instructions.

Related laboratory parameters of the two groups were collected and compared.

Statistical analysis

SPSS 22.0 software was used for processing and analysis. T-test was used for measurement data between two groups. The measurement data were expressed by ($\bar{x} \pm s$). Measurement data were compared using analysis of variance among three groups. χ^2 test was used for count data. $P<0.05$ was considered statistically significant.

Results

Comparison of IL-4, IFN-γ in serum and LTE4 in urine between the two groups

IL-4, IFN-γ in serum and LTE4 in urine in patients with eczema were significantly higher than that in control group ($p<0.05$, Table 1).

Table 1. *Comparison of IL-4, IFN-γ in serum and LTE4 in urine between the two groups ($\bar{x} \pm s$).*

Groups	Number of cases	IL-4 (pg/ml)	IFN-γ (pg/ml)	LTE4 (pg/ml)
Eczema group	84	64.82 ± 15.49	58.19 ± 15.43	85.74 ± 14.04
Control group	50	26.34 ± 6.27	24.52 ± 6.67	52.80 ± 12.13
t	-	16.748	14.621	13.801
p	-	<0.05	<0.05	<0.05

Comparison of IL-4, IFN-γ in serum and LTE4 in urine among different grades of eczema

The difference of IL-4, IFN-γ and LTE4 levels among different grades of eczema was significant ($p<0.05$). The levels were the highest in acute eczema patients, and lowest in chronic eczema patients (Table 2).

Table 2. *Comparison of IL-4, IFN-γ in serum and LTE4 in urine among different grades of eczema ($\bar{x} \pm s$).*

Groups	Number of cases	IL-4 (pg/ml)	IFN-γ (pg/ml)	LTE4 (pg/ml)
Acute eczema	27	78.12 ± 13.67	69.35 ± 16.32	96.21 ± 10.58
Subacute eczema	34	65.38 ± 10.53*	58.14 ± 10.26*	89.05 ± 16.52*
Chronic eczema	23	60.21 ± 9.36*#	49.32 ± 8.74*#	78.25 ± 12.38*#
F	-	6.382	5.499	8.219
p	-	<0.05	<0.05	<0.05

Note: Compared with acute eczema group, *p<0.05; Compared with subacute eczema group, #p<0.05.

Comparison of other laboratory parameters

There was no significant difference of albumin, Erythrocyte Sedimentation Rate (ESR), serum creatinine, globulin, platelets

and lymphocytes between eczema group and control group (p>0.05, Table 3).

Table 3. *Comparison of other laboratory parameters.*

Indexes	Acute eczema (n=27)	Subacute eczema (n=34)	Chronic eczema (n=23)	Groups (n=50)	F	p
Albumin (g/L)	45.28 ± 7.21	42.10 ± 6.12	40.89 ± 8.21	43.11 ± 6.24	1.273	>0.05
ESR (mm/h)	6.38 ± 2.12	6.14 ± 2.04	6.02 ± 1.83	5.84 ± 1.80	0.972	>0.05
Serum creatinine (μmol/L)	53.21 ± 10.55	50.28 ± 9.36	52.29 ± 12.14	50.84 ± 8.32	1.466	>0.05
Globulin (g/L)	26.53 ± 8.31	24.89 ± 5.20	25.63 ± 7.25	23.30 ± 5.63	1.028	>0.05
Platelets (10^9/L)	150.42 ± 28.75	156.73 ± 31.72	163.46 ± 26.40	159.32 ± 32.73	0.977	>0.05
Lymphocytes (10^9/L)	1.73 ± 0.83	2.06 ± 1.20	2.34 ± 1.31	1.93 ± 0.98	1.600	>0.05

Discussion

In normal circumstances, T cells can differentiate into Th1 and Th2 cells in accordance with a certain proportion. The two kinds of cells are in a dynamic equilibrium state, thus completing the body's normal immune response regulation [11-13]. Wherein Th1 cells are differentiated from Th0 cells under the effect of IL-12 and other factors, mainly secreting IL-2 and IFN-γ and other factors. Th1 cells have inhibition effect on Th2 cells mediated excessive immune response when mediating immune responses [14,15]. Th2 cells are differentiated from Th0 cells under the effect of IL-4 and other factors. Th2 cells produce IL-4, IL-6 and IL-10 and other factors, mainly mediating humoral immune responses [16]. Some scholars have suggested [17] IFN-γ and IL-4 were the most representative cytokines of the reflection of Th1, Th2 cellular immune response pattern. Leukotriene (LT), an arachidonic acid metabolite, is a potent inflammatory mediator, mainly including LTC4, LTD4 and LTE4 [18,19]. The biological role played by leukotrienes is mainly through the binding of type I (LT1) leukotriene and type II (LT2) leukotriene receptor on the cell membrane. Studies have shown [20,21], after allergen challenge, patients with atopic dermatitis were more prone to type I allergic late-phase reaction.

In the result of the study, IL-4, IFN-γ in serum and LTE4 in urine in patients with eczema were significantly higher than that in control group. The difference of IL-4, IFN-γ and LTE4 levels among different grades of eczema was significant. The levels were the highest in acute eczema patients, and lowest in chronic eczema patients. For serum IL-4, IFN-γ levels, Th1/Th2 balance was in a state of disorder in the body of young and middle-aged patients with eczema, suggesting dysfunction of Th subsets in patients with eczema. Moreover, there was a positive correlation between IL-4, IFN-γ levels and disease severity, indicating the more severe degree of illness, the more severe disorders of Th subsets functions. Urinary LTE4 levels significantly increased, and the more serious the prevalence level, the higher the LTE4 level, indicating that Cysteinyl Leukotrienes (CysLTs) involved in the onset of acute and chronic inflammatory reaction, suggesting that leukotrienes might be an important inflammatory mediator causing eczema.

In addition, for other laboratory parameters, although different, but there was no significant difference between patients with eczema and controls. This indicated that the onset of eczema did not cause changes in other specific laboratory indicators, or the insufficient number of patients included in this study as well as physical differences. This needs further studies.

In summary, IL-4, IFN-γ in serum and LTE4 in urine in young and middle-aged patients with eczema significantly increase along with the degree of illness, indicating that IL-4, IFN-γ in serum and LTE4 in urine might be involved in pathogenesis of eczema.

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*Correspondence to

Duan Baoxue

Department of Dermatology

Xiangyang No. 1 People's Hospital Affiliated with Hubei University of Medicine

PR China