Atopy patch test with Dermatophagoides pteronyssinus (Dp 1) in atopic dermatitis patients

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Atopy Patch Test with *Dermatophagoides pteronyssinus* (*Dp* 1) in Atopic Dermatitis Patients

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A B S T R A C T

The aim of this study was to evaluate the role of Dermatophagoides pteronyssinus *(Dp) in atopic dermatitis patients, using atopy patch test (APT) with Dp (extract 1). Twenty patients (males (m) = 9, females (f) = 11, mean age = 46.0 years, range = 19–78 years) with atopic dermatitis were involved in this study. The control group consisted of seventeen healthy subjects (m=7, f=10, mean age = 48.3, range = 24–64 years), with no personal or family history and no signs of atopy. Total IgE, specific IgE and a skin prick test were done for all subjects involved in this study. The atopy patch tests were performed with Dp (extract 1) in: 3,000, 10,000, 20,000 and 30,000 biological units per ml (BU/ml) concentrations using glycerol as medium. The total IgE was significantly higher in atopic dermatitis (AD) patients than in a control group with ($p<0.05$). After the tests six of twenty patients (30%) had positive APT results in the last two concentrations (20,000 and 30,000 BU/ml). However, all the results were positive after 48 h (and 72 hours), while no positive results were recorded in the control subjects. According to our study, APT with Dp1 in 20,000 BU/ml and reading time 48 h and 72 hours is to be recommended. The results suggest that APT may detect the trigger factor (Dp) in AD patients.*

Key words*: atopy patch test,* Dermatophagoides pteronyssinus*, atopic dermatitis*

Introduction

Atopic dermatitis (AD) is a chronic, inflammatory, primarily genetically determined skin disease, characterized by xerosis, pruritus and inflammation. Multiple genes are involved in the allergen process[1]. In addition to genetic factors, environmental factors also contribute to the prevalence of AD[2]. The prevalence of AD has increased during the past 20–30 years, so that its lifetime prevalence is estimated 10–15%[3]. Both, allergic and non-allergic, triggers can results in AD. Household dust mite (HDM), and animal dander are common aeroallergens known to cause AD exacerbations. The atopy patch test (APT) is a procedure which involves epicutaneous patch test with allergens known for eliciting IgE-mediated reactions and the evaluation of eczematous skin lesions[4]. The aim of this study is to evaluate the role of *Dermatophagoides pteronyssinus* (*Dp*) in AD patients, using APT with *Dp* (extract 1).

Materials and Methods

Patients with AD: Twenty patients (males (m) = 9, females (f) = 11, mean age = 46.0 years, range = 19–78 years) with AD fulfilling the criteria of Hanifin and Rajka[5] were involved in this study (when in remission), free of oral steroids and antihistamines for at least 7 days.

Control subjects: The control group consisted of 17 healthy subjects (m=7, f=10, mean age = 48.3, range = 24–46 years) with no personal or family history and no signs of atopy.

Total IgE was measured with Imx-test (Microparticle Enzyme Immunoassay-MEJA) Abbot Laboratories-USA (normal value <120 IU/ml). The specific IgE (RAST) was measured with CAP-RAST system (Pharmacia, Uppsala, Sweden). The levels of the specific serum IgE that were higher than >0.7 were regarded as positive.

Skin prick tests (SPT) were performed with standardized extract Dp with a (concentration: 3,000 biological units/ml, BU/ml) provided by the Institute of Immunology, Zagreb, Croatia. Questionable skin reaction (when < 3 mm diameter) were regarded as negative.

Atopy patch tests (APTs) were performed using *Dp*1 of concentrations: 3,000, 10,000, 20,000 and 30,000 BU/ml

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concentrations in glycerol as a vehicle (Institute of Immunology, Zagreb, Croatia), and vehicle only as negative control. Test substances were applied on the upper part of the patients' back, on clinically uninvolved, untreated and without tape stripping skin, with adhesive strips for the patch test (Curatest, Lohmann-Rauscher, Rengsdorf, Germany). SPT were done simultaneously with APT. APTs were removed and reactions were evaluated after 48 h and 72 hours of exposure.. Grading of positive APT reactions from +– to ++++ was mainly similar to the criteria used in conventional contact allergy patch testing (International Contact Dermatitis Research Group – ICDRG rules)[6].

χ^2 and Mann-Whitney's tests were used to evaluate group differences ($p<0.05$).

Results

The total serum IgE levels were higher in atopic dermatitis patients than in control subjects ($p<0.05$). In six of twenty AD patients (30%) atopy patch tests were positive in the last two concentrations (20,000 and 30,000 BU/ml). Positive results were not seen in smaller concentrations of allergen. In the five of six atopy patch test positive AD patients (83%) were RAST positive and SPT positive. Only one APT positive patient was both SPT negative and RAST negative (Table 1).

TABLE 1
ATOPY PATCH TESTS, SPECIFIC IgE (RAST) AND SKIN PRICK TESTS IN ATOPIC DERMATITIS PATIENTS

	APT + (N)	APT – (N)	Sum (N)
Dp (extract 1) All patients	6 (30%)	14 (70%)	20 (100%)
Prick test +	5	4	9
Prick test –	1	10	11
RAST +	5	2	7
RAST –	1	12	13

APT +/–: positive/negative patch test reaction after 48h and/or 72 hours
RAST +/–: more/less than >0.70 kU/L of specific IgE

SPT results were positive in nine of twenty AD patients (45%), with seven of them (78%) RAST positive.

All the positive results were noted after 48 hours (and 72 hours). Concordance between APT positive, SPT positive and RAST positive results was noted in the AD patients. No positive results (APT, SPT and RAST) in healthy control subjects were obtained.

Discussion

Atopic dermatitis is a genetically determined, IgE mediated, delayed-type hypersensitivity reaction of the skin[7]. There is an increased number of evidence that T-cell responses to environmental allergens are important in the pathogenesis of AD[8,9]. The household dust mite, *Dermatophagoides*, has been shown to enhance symptoms of atopic dermatitis and other atopic diseases[4,10]. Atopy patch tests involves the epicutaneous application of the intact protein allergens in diagnostic patch tests setting, with an evaluation of the induced eczematous the skin lesion made after 48–72 hours[11,12]. Various concentrations of allergens for atopy patch tests were used.

Two hundred fifty-three adults with AD, in remission, were tested in seven study centers on clinically uninvolved, unabraded back skin with 3,000 to 10,000 PNU/g of *Dp*, cat dander, grass, birch and mugworth pollen allergen extract in petrolatum. After SPT, RAST and detailed history on aeroallergen-induced eczema flare was obtained. Readings were done after 48 to 72 hours of exposure. The percentage of clear-cut positive APT reaction with Dp 1 was 40%. APT results showed significant concordance with history, SPT and RAST for *Dp*, cat dander and grass pollen. The optimal test concentration for *Dp* was 7,000 PNU/g[13]. Darsow et al. (1996), are fifty-seven patients divided in two groups: group I with air-exposed pattern of atopic eczema, and group II which did not have air-exposed pattern of atopic eczema. APT was done with house dust mite, cat dander and grass pollen mixture. The allergens concentrations were 500–10,000 PNU/g. The most frequently elicited positive APT reactions were with dust mite (80%), and the most positive results were in group I. The optimal allergen concentration for HDM was 5,000 PNU/g and this rate could not be increased significantly by doubling the allergen dosage[12].

Optimal allergen concentration of 500x SPT and exposure time of 48 hours is recommended by Van Vorst Vader et al.[14].

Goon et al.[15], performed APT, skin prick test (SPT), and RAST on 73 patients with atopic dermatitis and on 38 non-atopic controls. The allergens used were house dust mite, cat dander, Bermuda grass and German cockroach. APT for house dust mite correlated with RAST test, while APT for cat fur correlated with SPT.

Among our AD patients (n=20), six APT positive results (30%) were noted. Positive results were obtained with allergen (*Dp*) concentrations of 20,000 and 30,000 BU/ml. Most of the APTs positive in our AD patients were SPT positive and RAST positive. This was also observed by others authors[13,16,17]. The frequency of positive APT in patients with AD in the literature varied from 15% to 100%, owing to different test techniques and selection of patients[18]. Different results were also related to various allergen concentrations used for APT[19]. The maximum of the positive test reactions was observed after 48 hours in the majority of the cases previously published[13,14,20]. In our study all the results were positive after 48 h (and 72 hours).

According to our results the optimal allergen concentration *Dp* in APT is 20,000 BU/ml, so we recommend this concentration with an exposure time of 48–72 h. For APT concentration expressed in PNU/g the optimal allergen dose range 5,000–7,000 is recomended[21].

The reading time after 48 h and 72h is also recommended by others authors[12,19].

The results presented above suggest that APT may detect the relevant trigger factor in AD patients with higher specific quality than available tests[22]. The major approach to management of AD is avoidance of triggers. If the offending allergens can be identified on basis of the history and the diagnostic testing, avoidance of these would be a key for reduced flares[2]. Further investigations must give an answer for the role of APT in diagnosis of a subgroup of AD patients which flare after contact with HDM, respectively with *Dp*.

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ATOPIJSKI »PATCH» TEST S *DERMATOPHAGOIDES PTERONYSSINUS* (*Dp*) U BOLESNIKA S ATOPIJSKIM DERMATITISOM

SAŽETAK

Cilj rada bio je procjena uloge *Dermatophagoides pteronyssinus* (*Dp*) u bolesnika s atopijskim dermatitisom (AD), koristeći atopijski »patch» test (APT) s *Dp-om* (ekstrakt 1). Dvadeset bolesnika s AD-om, (9 muškaraca i 11 žena, od 19–78 godina, prosječne dobi 46,0 godina), s AD-om uključeni su u studiju. Kontrolna skupina bila je sastavljena od 17 zdravih osoba (7 muškaraca i 10 žena, od 24–64 godina, prosječne dobi 48,3 godina), bez osobne i obiteljske anamneze o atopiji te znakova iste.U svih ispitanika urađen je: kožni »prick» test (SPT), ukupni IgE, specifični IgE prema *Dp-u* i APT s *Dp* u koncentracijama: 3.000, 10.000, 20.000 i 30.000 bioloških jedinica/ml (BJ/ml) u glicerolu kao otapalu. U 6 od 20 (30%) bolesnika s AD-om APT bio je pozitivan u koncentracijama od 20.000 i 30.000 BJ/ml. Svi pozitivni testovi očitani su nakon 48 i 72 sata. Nisu nađeni pozitivni testovi u članova kontrolne skupine. Prema našim rezultatima preporučuje se koncentracija *Dp-a* u APT-u od 20.000 BJ/ml i očitavanje rezultata nakon 48 i 72 sata.