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Research Article

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# Characteristics of Atopic Dermatitis in Patients Over 60 Years of Age

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## Abstract

***Introduction***

*Atopic dermatitis (AD) is a chronic, inflammatory and relapsing disease most commonly associated with elevated immunoglobulin E levels and a history of atopy, often coexisting with allergic asthma and allergic rhinitis. However, there is little data on the prevalence of allergies, including atopic diseases, in patients over 60.*

***Aims***

*This study aimed to present AD's characteristics and possible clinical differences in a prospective analysis of patients over 60 years of age compared to young patients.*

***Material and Methods***

*Patients were evaluated according to the SCORAD score, total IgE and allergen-specific IgE (sIgE) levels were measured using the Poly Check immunoenzymatic method, skin prick tests were performed and quality of life was assessed according to the Dermatology Life Quality Index. The study group comprised 144 subjects with a mean age of 66.3±4.54 years. The control group comprised 92 subjects with a mean age of 24.1±4.32 years.*

***Results***

*Poorer quality of life and often inadequate AD treatment have been observed compared with younger people. In more than half of the elderly patients with AD, bad treatment was observed, and the use of drugs was ignificantly less frequent than in younger patients, except for topical steroid preparations.*

***Conclusion***

*AD in patients over 60 years of age has similar clinical characteristics to younger people. The slight difference in allergy diagnostic results compared with younger people indicates the need to perform the same tests in seniors.*

***Keywords:*** *Atopic Dermatitis, Older, Ige*

## Introduction

Atopic dermatitis (AD) is a chronic, inflammatory and heterogeneous disease affecting both children and adults. AD is most commonly associated with elevated immunoglobulin E (IgE) levels and a history of atopy, often coexisting with allergic asthma and allergic rhinitis [1-3]. The symptoms of this disease are persistent pruritus, erythematous-pustular-bullous lesions with high heterogeneity of lesions and recurrent relapses with periods of remission [4]. Statistically, AD is more common in children than adults, as it is more common in urbanized cities than in rural areas. In most cases, AD appears before age five, and data on prevalence in children show a slight predominance in females [10, 11]. The prevalence of AD in European adolescents is estimated at 1.5% to 15% and in adults at 2.2% of the German population to 8.1% of the Italian population [5-9].

Multiple mechanisms are involved in the pathogenesis of AD, including epidermal barrier dysfunction, genetic factors, immune

dysregulation at the Th2 cell level, an altered skin microbiome, and environmental inflammation triggers [12-14]. Whether dermatitis is initiated by skin barrier dysfunction ("outside-in" hypothesis) or by immune dysregulation ("inside-out" hypothesis) remains a matter of debate. It is increasingly thought that a combination of different mechanisms leads to multiple 'endotypes' and phenotypes of AD [15].

Data on the prevalence of allergies, including atopic diseases, in patients over 60 years of age are scarce. In the ESTHER study performed between 2000 and 2002 on a group of 9949 patients with a mean age of 62 years (range: 50-75 years), the prevalence of atopic diseases was estimated as follows: AD at 4.3%, bronchial asthma at 5.5% and allergic rhinitis at 8.3% in the study population [16]. Until recently, it was thought that the prevalence of allergic diseases decreases with age, coupled with a decrease in IgE levels and skin reactivity to allergen testing. The actual assessment of this phenomenon remains a problem. In the available literature, all epidemiological analyses usually concern the younger patient population (often up to 45-60 years of age). Only occasionally does the subcategory of older adults appear, but without a separate and detailed analysis. This age group has even less information on allergies to specific inhalants and food allergens [17-19]. This is related to the frequent abandonment of diagnostic skin tests due to limitations such as skin ageing, the need to use drugs that interfere with skin reactivity, and the reluctance of patients and doctors due to persistent stereotypes. AD in the elderly is a complex phenomenon to assess due to the typical multi-disease nature of this group and, as mentioned earlier, the presence of skin ageing and other co-present skin diseases [20].

This study aimed to present the characteristics and possible clinical differences of atopic dermatitis in a prospective analysis of patients over 60 years of age compared to younger patients.

## Materials and Methods

### Study Group, Control Group

Using medical databases, patients were recruited in dermatological and allergological clinics in Upper Silesia. Initially, 246 patients were selected through the analysis of ICD-10 codes: L-20, L-20.8 and L20.9. Finally, 144 patients with AD were qualified for the study group based on meeting the Hanifin and Rajka criteria during the medical examination conducted by a specialist allergist and dermatologist [21]. They included 74 women and 70 men with a mean age of 66.3±4.54 years (age range: 60.1-78.6 years). The comparison group consisted of young patients diagnosed with AD according to the criteria used for the respective study group. There were 92 patients with a mean age of 24.1± 4.32 years (age range: 18-29 years), including 46 females and 46 males. All patients signed informed consent to participate in the study. Consent was obtained from the Bioethics Committee at SUM Katowice (KNW/0022KB1/139/09).

### Dermatological Evaluation

All subjects underwent detailed dermatological evaluation, including SCORAD score. The following grades of AD were used: severe -SCORAD ≥50 points, moderate 25-50 points and mild below 25 points.

### Allergological Procedures

IgE determinations Total IgE and allergen-specific IgE (sIgE) concentrations were measured using the Poly Check immunoenzymatic method (EMA, Poland), and values were presented in kU/l. Studies of allergen-specific IgE concentrations were performed for the following allergens:
D. pteronyssinus, D. farinae, fungi mix I and II, Alternaria tenuis, Cladosporium herbarum, grasses mix, trees mix, birch, alder, hazel, mugwort, dog, cat, duck feathers, cockroach, milk, hen egg, cocoa, citrus, pork, beef, wheat flour, rye flour, walnut, peanut, hazelnut, tomato, apple, celery, carrot, cod, poultry, banana, strawberries. IgE values above 0.35 kU/l were taken as positive.

### Skin Tests

### Skin Prick Tests

In the study, point skin tests (PTS) were performed with a set of allergens corresponding to the allergen-specific IgE determinations. Determinations were performed using Allergopharma tests (Reinbeck, Germany) as the Polish Society of Allergology recommended. Wheel diameter of at least 3 mm was considered a positive test result.

### Epidermal Tests

All patients underwent patch tests with the True Test kit (Mekos Laboratories AS, Denmark) applied as 2 patches of 12 allergens on the back. Readings were taken after 48 and 72 hours according to the Ring Scale, where: doubtful (+/-) is an erythematous reaction, mild positive (+) - erythema, infiltration, possible papules, positive (++) - erythema with infiltration, numerous papules and single vesicles and strongly positive (+++) - numerous clusters of papules and vesicles. The European Standard included: 1. nickel sulphate, 2. sterol alcohols from lanolin 3. neomycin sulphate, 4. potassium dichromate, 5. a mixture of cains, 6. a mixture of fragrances, 7. rosin, 8. epoxy resin, 9. a mixture of quinolines, 10. balsam of Peru, 11. ethylenediamine dihydrochloride, 12. Cobalt chloride, 13. P-tetra-butyl-phenol-formaldehyde resin, 14. paraben mixture, 15. carbon derivative mixture, 16. black rubber mixture, 17. Kathon CG, 18. Quaternium-15, 19. mercaptobenzothiazole, 20. para-phenylenediamine, 21.formaldehyde, 22. mercaptan derivative mixture, 23. thimerosal, 24. thiram mixture.

### Quality of Life Assessment

In all subjects, quality of life in AD was assessed using the DLQI (Dermatology Life Quality Index) questionnaire, which contains 10 questions (Polish language version) concerning subjective skin complaints, the influence of the disease on daily occupational and domestic activities and treatment. The author's permission to use the DLQI was obtained (consent and DLQI website). All questions were answered on a scale of symptoms: not at all, a little bit, very much, which were assigned scores from 0 to 3 points (maximum 30 points). In all subjects, the type of AD treatment administered

was additionally analyzed.

### Statistical Analysis

Descriptive statistics were used in the analysis: means, medians and standard deviations. The chi-square test was used to compare the characteristics of the studied groups. Tested correlations were analyzed by Spearman's rank correlation test. The odds ratios for the occurrence of AD was calculated. Bonferroni correction was applied in statistical analyses. P<0.05 was considered statistically significant.

## Results

### Dermatological and Allergological Assessment

A detailed comparison of the studied groups is presented in Table 1. In the group of older people with AD, the severe form of the disease was observed less frequently, and allergy symptoms before the age of 5 were less frequent in the history.

**Table 1: Characteristics of the study groups**

| CHARACTERISTICS TO BE EXAMINED | ELDERLY WITH AD N= 144 | YOUNG WITH AD N=92 | P ^ |
|---|---|---|---|
| Medium age, years | 63,5 ± 2,6 | 21,2 ± 4,21 | <0,05 |
| women (%) | 74(51,4) | 46(50) | NS |
| smokers (%) | 27 (18,75) | 39 (42,4) | <0,05 |
| Ex-smokers(%) | 36 (25) | 7 (7,61) | <0,05 |
| positive family history of atopy (%) | 87 (60,42) | 78 (84,78) | NS |
| positive history of atopy in childhood (do 5 r.ż.) % | 98 (68,1) | 83(90,22) | <0,05 |
| duration of illness, years | 36,1 ± 19,5 | 11,8 ± 6,7 | <0,05 |
| the currency 4 major criteria of Hanifin and Rajka (%) | 97 (67,36) | 85 (59,03) | NS |
| average index SCORAD | 24,6 ± 11,8 | 40,12 ± 19,51 | <0,05 |
| Major AD (%), SCORAD>50 points | 7 (4,86) | 12 (13,04) | <0,05 |
| medium AD (%), SCORAD 25-50 points | 43 (29,86) | 29 (31,52) | NS |
| mild AD (%), SCORAD <25 points | 94 (65,3) | 51 (55,43) | NS |
| beginning of disease after the age of 50 (%) | 14 (9,72) | - | - |
| other comorbid atopic diseases: | | | |
| present asthma | 21 (14,58) | 17 (18,48) | NS |
| present seasonal allergic rhinitis or year-round allergic rhinitis | 84 (58,3) | 52 (56,53) | NS |
| Asthma+ seasonal allergic rhinitis / year-round allergic rhinitis | 18 (12,5) | 14 (15,22) | NS |

*Legend: ^chi-square test with Bonferroni correction; NS - not statistically significant*

### Allergological Diagnosis

Total IgE (geometric mean ± SD) in elderly patients with AD was 1678 ± 759 kU/l (range: 76 - 27 460 kU/l) and was statistically significantly lower than in young patients 6980 ± 3721 (89 - 43 201 kU/l) for p<0.05. Low IgE values were recorded in 17 (11.8%) patients over 60 years of age with AD. The results of skin tests and allergen-specific IgE determination in elderly patients with AD are shown in Table 2, comparing them to young patients with AD.

**Table 2: Comparison of the prevalence of allergy to individual allergens by skin testing and allergen-specific IgE in young and elderly AD patients.**

| ALLERGENS | PST – POSITIVE FINDINGS | | P^ | sIgE – POSITIVE FINDINGS | | P^ |
|---|---|---|---|---|---|---|
| | elderly n=144 (%) | young n=92 (%) | | Elderly n=144 (%) | Young n=92 (%) | |
| D. pteronyss. | 35 (4,31) | 24 (26,1) | NS | 41 (28,47) | 27 (29,38) | NS |
| D. farinae | 32 (22,2) | 26 (28,26) | NS | 39 (27,08) | 29 (31,52) | NS |
| Mushrooms mix I | 14 (9,72) | 10 (10,87) | NS | 18 (12,5) | 12 (13,04) | NS |
| Mushrooms mix II | 7 (4,86) | 5(5,43) | NS | 8 (5,56) | 6 (6,52) | NS |
| Alternaria | 7 (4,86) | 6 (6,52) | NS | 14 (9,72) | 8 (8,70) | NS |

| | | | | | | |
|---|---|---|---|---|---|---|
| Cladosporium | 3 (2,1) | 5 (5,43) | NS | 6 (4,17) | 5 (5,43) | NS |
| Grasses mix | 20 (13,89) | 17 (18,48) | NS | 26 (18,06) | 20 (21,74) | NS |
| Trees mix | 17 (11,81) | 19 (20,65) | <0.05 | 24 (16,67) | 2 (2,17) | <0.05 |
| Birch | 10 (6,94) | 12 (13,04) | <0,05 | 17 (11,81) | 16 (17,39) | NS |
| Alder | 6 (4,17) | 10 (10,87) | NS | 6 (4,17) | 15 (16,3) | <0.05 |
| Hazel | 4 (2,78) | 10 (10,87) | <0,05 | 8 (5,56) | 14 (15,22) | <0.05 |
| Mugwort | 7 (4,86) | 7(7,61) | NS | 11 (7,64) | 7 (7,61) | NS |
| Dog | 2 (1,39) | 2(2,17) | NS | 3 (2,08) | 4 (4,35) | NS |
| Cat | 6 (4,7) | 8(8,7) | NS | 5 (3,47) | 9 (9,78) | NS |
| Duck feathers | 0 (0) | 2 (2,17) | NS | 0 (0) | 1 (1,09) | NS |
| Cockroach | 4 (2,78) | 6 (6,52) | NS | 13 (9,03) | 9 (9,78) | NS |
| Milk | 6 (4,17) | 9(9,78) | NS | 11 (7,64) | 10 (10,87) | NS |
| Hen's egg | 4 (2,78) | 11 (11,96) | <0,05 | 1 (0,69) | 11 (11,96) | NS |
| Cocoa | 7 (4,86) | 12 (13,04) | NS | 11 (7,64) | 11 (11,96) | NS |
| Citrus fruits | 4 (2,78) | 7 (7,61) | NS | 12 (8,33) | 9 (9,78) | NS |
| Pork | 2 (1,39) | 3 (3,26) | NS | 3 (2,08) | 5 (5,43) | NS |
| Beef | 1 (0,69) | 5 (5,43) | NS | 4 (2,78) | 6 (6,52) | NS |
| Wheat flour | 4 (2,78) | 10 (10,87) | NS | 7 (4,86) | 11 (11,96) | <0,05 |
| Rye flour | 0 (0) | 8 (8,7) | <0,05 | 4(2,78) | 14 (15,22) | <0,05 |
| Walnuts | 0 (0) | 2 (2,17) | NS | 0 (0) | 5 (5,43) | NS |
| Hazelnuts | 2 (1,39) | 5 (5,43) | NS | 0 (0) | 6 (6,52) | NS |
| Peanuts | 1 (0,69) | 3 (3,26) | NS | 2 (1,39) | 4 (4,35) | NS |
| Tomatoes | 6 (4,17) | 10 (10,87) | NS | 7 (4,86) | 9 (9,78) | NS |
| Apples | 3 (2,08) | 8 (8,7) | NS | 6 (4,17) | 12 (13,04) | NS |
| Celery | 6 (4,17) | 9(9,78) | <0,05 | 10 (6,94) | 13 (14,13) | <0,05 |
| Carrot | 3 (2,08) | 7 (7,61) | NS | 7 (4,86) | 8 (8,7) | NS |
| Potato | 2 (1,39) | 6 (6,52) | NS | 4 (2,78) | 9 (9,78) | NS |
| Codfish | 3 (2,08) | 5 (5,43) | NS | 4 (2,78) | 4 (4,35) | NS |
| Poultry | 1 (0,69) | 2 (2,17) | NS | 2 (1,39) | 3 (3,26) | NS |
| Bananas | 2 (1,39) | 4 (4,35) | NS | 4 (2,78) | 2 (2,17) | NS |
| Strawberries | 5 (3,47) | 10 (10,87) | NS | 10 (6,94) | 10 (10,87) | NS |

*Legenda: ^chi-square test with Bonferroni correction, PST- point skin tests, sIgE- allergen-specific IgE; NS - not statistically significant*

Skin test results confirmed allergies to inhalants and food allergens, but the percentage of positive test results was lower than the corresponding allergen-specific IgE determinations. This difference in favour of positive sIgE results was more pronounced in older patients. No statistically significant differences in the allergy profile were observed in elderly patients compared to young patients.

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A significant correlation was observed between positive skin test results and sIgE for all allergens in the Spearman rank correlation test for $p<0.05$ in elderly and young patients with AD. Negative allergy test results were observed in 16 (11.1%) patients over 60 years of age with AD and in 7 (7.6%) young patients with AD.

The distribution of skin lesions in AD is shown in Table 3. Older patients showed more severe skin lesions than young patients, which predominated on the hands and feet. In younger patients, generalized skin lesions were observed significantly more often.

**Table 3: The distribution of skin lesions in AD.**

| LOCALIZATION | ELDERLY WITH AD N=144 (%) | YOUNG WITH AD N=92 (%) | P^ |
|---|---|---|---|
| Palms | 54 (37,5) | 17 (18,48) | <0,05 |
| Upper limbs | 57 (39,5) | 41 (44,57) | NS |
| Feet | 27 (18,75) | 11 (11,96) | NS |
| Lower limbs | 56 (38,89) | 42 (45,65) | NS |
| Face | 58 (40,3) | 40 (43,48) | NS |
| Neck | 25 (17,3) | 19 (20,65) | NS |
| Shoulders | 12 (8,33) | 15 (16,3) | <0,05 |
| Torso (back) | 22 (15,28) | 14 (15,22) | NS |
| Torso (front) | 26 (18,06) | 16 (17,39) | NS |
| genital area | 11 (7,64) | 4 (4,35) | NS |
| generalised lesions | 38 (26,39) | 40 (43,48) | <0,05 |

*Legend: ^chi-square test with Bonferroni correction, AD- atopic dermatitis NS - not statistically significant*

In 31 out of 135 (22.9%) patients over 60 years of age with AD, positive epidermal tests to European standard allergens were observed, most frequently to nickel salts in 21 (15.6%), to a fragrance cocktail in 9 (6.7%) and to chromium salts in 7 cases (5.2%). In young patients, positive epidermal tests were significantly less common, occurring in 12 of 90 (13.3%) patients (chi-square test p<0.05). In young patients, a positive reaction to thimerosal was more frequent, i.e. in 6 patients (6.7 %) and to nickel in 6 (5.6 %). Contact eczema as an associated disease was observed in 19 (18.6%) elderly patients with AD and in 6 (6.8%) young patients. This difference was statistically significant by the chi-square test for p<0.05

Accompanying other skin lesions was also observed in elderly patients with AD. The results are shown in Table 4.

**Table 4: Accompanying other skin lesions in elderly patients with AD**

| DERMATOSIS | ELDERLY WITH ADN=144 (%) | YOUNG WITH ADN=92 (%) | P^ |
|---|---|---|---|
| Chronic urticaria | 9 (6,25) | 8 (8,70) | NS |
| Psoriasis | 2 (1,39) | 1 (1,09) | NS |
| Skin or nail mycosis | 28 (19,44) | 9 (9,78) | <0,05 |
| Rosacea | 2 (1,39) | 2 (2,17) | NS |
| Lichen planus | 3 (2,08) | 0 (0) | NS |
| Ulcers of lower extremities | 9 (6,25) | 0 (0) | <0,05 |
| Vitiligo | 2 (1,39) | 1 (1,09) | NS |
| Contact eczema | 19 (16,6) | 6 (6,8) | <0,05 |
| Other | 7 (4,86) | 5 (5,43) | NS |

*Legend: ^ chi-square test with Bonferroni correction, AD- atopic dermatitis, NS - not statistically significant*

## Quality of Life and Treatment Of AD

The characteristics of AD treatment of elderly patients compared to young patients are shown in Table 5.

**Table 5: The characteristics of AD treatment of elderly patients compared to young patients**

| KIND OF TREATMENT | ELDERLY WITH AD N = 144 (%) | YOUNG WITH ADN = 92 (%) | P^ |
|---|---|---|---|
| Regular antihistamines | 65 (45,14) | 71 (77,17) | <0,05 |
| Regular emolients | 38 (26,39) | 47 (51,09) | <0,05 |
| Topical steroids | 76 (52,78) | 49 (53,26) | NS |
| Topical calcineurin inhibitors | 11 (7,64) | 24 (26,09) | <0,01 |
| Oral steroids periodically | 46 (31,95) | 21 (22,83) | <0,01 |
| Cyclosporine | 11 (7,64) | 16 (17,39) | <0,05 |
| No chronic treatment | 74(51,39) | 25 (27,72) | <0,05 |

*Legend: ^ chi-square test with Bonferroni correction, AD- atopic dermatitis*

More than half of elderly AD patients reported inadequate treatment, including skin care, and significantly less frequent use of drugs than younger patients, except topical steroids. The quality of life assessed in elderly AD patients according to the DLQL questionnaire was worse compared to the young group and was respectively: 18.5 ± 5.6 (mean value ± SD) and 10.78 ± 1.13 (chi-square test, $p<0.05$).

## Discussion

The association of AD with late age is not common, especially in patients who are over 60 years of age. The possibility that this disease is underestimated in the elderly population may be due to the patient's unwillingness to undergo dermatological-allergic diagnostics or focus on other civilization diseases, which are often more burdensome. The confirmed gender distribution, fulfilment of the Hanifin and Rajka criteria, sample allergy profiles and similar co-presence of other atopic diseases as in young patients with AD allow us to conclude that the course of the disease is similar in older patients. Works presenting the problem of diagnosis and treatment of AD in seniors are scarce and concern small populations [22,23,24,25]. Some works, mostly epidemiological, combine collections of different dermatoses, including many forms of eczema and secondary skin allergies [26,27,28,29].

As mentioned, the allergy diagnostic results obtained were compared with the group of young people with AD. This is a testimony to the high activity of IgE-dependent reactions underlying this disease, even at a late age. Low IgE levels and a negative allergological diagnosis were observed in about 8% of older patients and, slightly more frequently, in 10% of younger patients with AD. These observations are consistent with the study of Folster, who confirms the occurrence of non-IgE-dependent AD in about 6.9% [30]. In another study, Tanei highlights a similar proportion of intrinsic and extrinsic AD in all age groups [31]. The data obtained in the present study do not differ from this observation. The localization of skin lesions in the elderly with AD did not differ significantly from the young except for a more frequent localization on the hands, and AD was less frequently generalized compared with the young. Different localization of skin lesions in AD in older patients was emphasized by some authors [20, 31, 32], where, in addition to the hands, lesions occurred particularly more frequently on the trunk and neck and less frequently on the feet.

The co-presence of contact eczema in AD patients was similar to other reports [33, 34]. Contact eczema was observed more frequently in elderly patients than in young people with AD. Despite the often reported symptoms of food intolerance by the seniors studied, IgE-dependent allergy did not have a high prevalence, as mentioned earlier.

Observations on AD treatment indicate a remarkable lack of appropriate atopic skin care in elderly patients. Also, other treatment methods, e.g. cyclosporine or topical calcineurin inhibitors, were used less frequently at the expense of steroid therapy. It seems that the consequence of ineffective treatment is the problem of worse quality of life, which was observed in the examined seniors. Persistent itching of the skin, aversion to daily activities, and avoidance of interpersonal contact were some of the problems seen in the completed DLQI questionnaires. A similar observation of the low quality of life in AD was made by Baron [35]. He also observed its improvement after AD treatment based on DLQI questionnaire results, which correlated well with SCORAD values. Especially rapid progress was seen in older patients [35]. The current work did not observe a similar correlation between SCORAD and DLQI. This may be due to the milder forms of AD analyzed and more minor differences in SCORAD before and after treatment than in Baron's work. The quality of life in AD continues to be investigated in many papers [36, 37, 38].

## Conclusions

AD in patients over 60 is a disease with a similar clinical picture to young people. A slight difference in the results of allergological diagnostics in young people indicates the need for its performance in seniors. At the same time, a worse quality of life and often inadequate AD treatment was observed compared to younger people.

All authors declare no conflicts of interest.

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