

Contact Sensitization of Older Patients in an Academic Department in Naples, Italy

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Background: Contact allergy develops in predisposed individuals as a consequence of environmental exposure to allergens. Exposure patterns change over time because of many factors (sex, age, occupation, fashion trends, official regulations), and the delayed hypersensitivity response depends significantly on the age of the subject.

Objective: The aim of the present study was to investigate the prevalence of contact sensitization in older patients (older than 65 years) referred to our allergologic clinic.

Methods: All patients were patch-tested with the standard series of the Società Italiana di Dermatologia Allergologica, Professionale e Ambientale, and 32 patients were also tested with additional series.

Results: Of 117 examined subjects, 48 (41%) developed at least one positive reaction whereas 22 of 117 (19%) showed more than one sensitization. Allergic contact dermatitis was detected in 13% of our sample. The five most frequent allergens were nickel sulfate (13.7%), potassium dichromate (11.1%), cobalt chloride (7.7%), para-phenylenediamine (5.2%), and balsam of Peru (4.3%).

Conclusion: These findings suggest an age-dependent decline of overall positive patch-test reactions but a higher sensitization rate to some allergens.

CONTACT ECZEMA from both irritant and allergic sources is the reason for 6 to 10% of all dermatology clinic visits and is an important dermatologic disease with considerable morbidity and economic impact. This is aggravated by the fact that contact sensitization is not curable and necessitates lifelong avoidance of the allergens for secondary prevention.^{1,2}

In persons of every age, patch testing has proved to be a useful tool for the detection of allergic skin eczema and the identification of the causative allergen.³ Standard test series usually detect between 70 and 80% of all contact allergies.⁴

Contact allergy develops in predisposed individuals as a consequence of environmental exposure to allergens. Exposure patterns change over time because of fashion trends, technological development, official regulations, regional traditions, or environmental specifications.⁵

The response to delayed hypersensitivity antigens depends significantly on the age of the individual.⁶ On one hand, with increasing age, the chance to develop a

contact sensitization is likely to rise, according to higher cumulative exposure to many allergens; on the other hand, the immune skin response in older people seems to be less effective than in young people. The most pronounced decrease is observed in the T-lymphocyte cells, and it is said that as an effect of this decline, the incidence of delayed hypersensitivity reaction is lower in aged patients than in younger patients.⁷ Only a few studies have evaluated patch-test reactivity in elderly persons with an adequately large population.^{8–10}

The aim of this study was to investigate the prevalence of contact sensitization in older patients (> 65 years of age) referred to the Dermato-allergology Clinic of the University of Naples Federico II.

Methods

This was a prospective study on contact sensitization in elderly persons.

Patch Testing

All patients were patch-tested with the standard series of the Società Italiana di Dermatologia Allergologica, Professionale e Ambientale (SIDAPA) (Table 1); tests with additional series were performed in 32 patients, according to clinical history and physical examination.

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DOI 10.2310/6620.2008.07076

Table 1. SIDAPA Standard Series

Hapten	Concentration (%)	Vehicle
1. Thiuram mix	1	pet
2. Potassium dichromate	0.5	pet
3. Balsam of Peru	25	pet
4. N-Isopropyl-N-phenyl-4-phenylenediamine	0.1	pet
5. Kathon CG	0.01	aq
6. para-Phenylenediamine	1	pet
7. Wool alcohols	30	pet
8. Colophony	20	pet
9. Neomycin sulfate	20	pet
10. Cobalt chloride	1	pet
11. Epoxy resin	1	pet
12. Formaldehyde	1	aq
13. Mercaptobenzothiazole	2	pet
14. 4-tert-Butylphenol formaldehyde resin	1	pet
15. Nickel sulfate	5	pet
16. Disperse Yellow 3	1	pet
17. Fragrance mix	8	pet
18. Paraben mix	16	pet
19. Disperse Blue 124	1	pet
20. Benzocaine	5	pet
21. Methylidibromoglutaronitrile	0.3	pet
22. Corticosteroid mix	2.01	pet
23. Lyril	5	pet
24. Mercapto mix	2	pet
25. Desoxymethasone	1	alc
26. Petrolatum	100	—

alc = alcohol; aq = water; pet = petrolatum; SIDAPA = Società Italiana di Dermatologia Allergologica, Professionale e Ambientale.

Patch testing was performed with IQ Chambers (Chemotechnique, Vellinge, Sweden) made of inert polyethylene plastic. Patch tests were applied to a dermatitis-free area on each patients's upper back. The patient was subsequently instructed to keep the test area dry and to return in 2 days. The patches were removed, and the initial reading was performed at day 2 (D2). The final interpretation was performed the next day (D3), the better to assess irritant reactions, possible delayed reactions, and false-positive reactions. All test results were read by the same dermatologist. Test sites were evaluated according to SIDAPA guidelines. Results were recorded as negative; doubtful; and +, ++, and +++, respectively, for weak, moderate, and strong. After patch testing, the clinical relevance of the positive patch-test reactions was evaluated.

To evaluate the time course of allergic reaction, three dynamic reaction patterns were distinguished: stable (D2 grade = D3), increasing (D2 grade < D3), and decreasing (D2 grade > D3).

Patients

All patients older than 65 years attending our contact and occupational dermatoses clinic between January 2004 and December 2006 were included in the study.

We selected the age of 65 as the minimum age for our elderly population, according to other studies^{9,10}; of 1,370 patients referred to our allergologic clinic, 117 were older than 65 years.

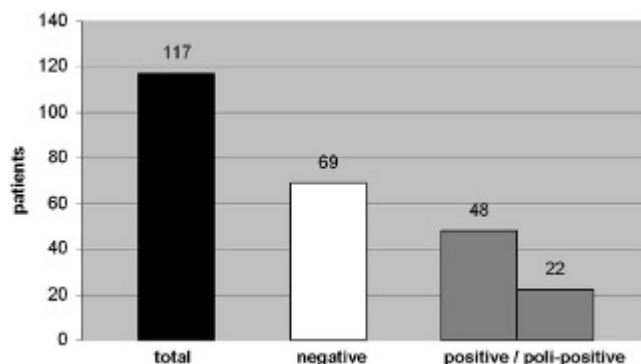
Patch testing was performed in patients presenting with skin manifestations possibly related to contact dermatitis. A detailed history, careful examination of the patient's skin disease, and suspected allergens were recorded.

Our sample consisted of 51 males (43.6%) and 66 females (56.4%). The mean age was 71.2 years (range, 65–86 years); 47.1% of the patients were aged between 65 and 70 years, 48.7% were between 71 and 80 years of age, and 4.2% were older than 80 years.

Only 6 of the 117 subjects had a personal history of atopic disease (atopic dermatitis, rhinitis, or asthma).

Results

Of 117 examined patients, 48 (41%) developed at least one positive reaction whereas 22/117 (19%) showed more than one sensitization. In total, 66 positive reactions were detected (Fig 1). There was no significant difference in the distribution by sex of positive reactions.

**Figure 1.** Summary of patch test reactions.

Dynamic Pattern of Reactions

We observed that the dynamic time course of overall patch-test reactions in our sample was “increasing.” The increasing pattern (D2 grade < D3) was detected in 64% of overall positive reactions, followed by the stable (D2 grade = D3) and decreasing (D2 grade > D3) patterns found in 29% and 7%, respectively (Fig 2).

Allergens

The five most frequent allergens were nickel sulfate (13.7%), potassium dichromate (11.1%), cobalt chloride (7.7%), para-phenylenediamine (5.2%), and balsam of Peru (4.3%) (Table 2).

Diagnoses

The main final diagnoses in patch-test-positive patients were allergic contact dermatitis (ACD) (13%), xerotic eczema (8%), and irritant contact dermatitis (6%) whereas in patch-test-negative patients, xerotic eczema (15%), irritant contact dermatitis (10%), and prurigo (9%) were the main final diagnoses.

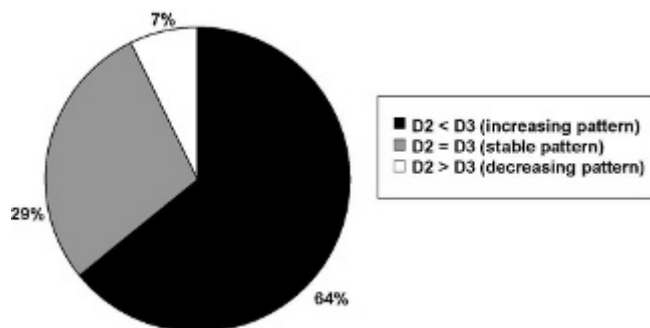


Figure 2. Summary of dynamic patterns. D2=day 2; D3=day 3.

Table 2. Five Most Frequent Sensitizers

Hapten	Overall %
Nickel sulfate	13.7
Potassium dichromate	11.1
Cobalt chloride	7.7
para-Phenylenediamine	5.2
Balsam of Peru	4.3

Sites

The primary affected sites in patch-test-positive patients were diffuse sites (12%), hands (6%), and lower limbs (6%) whereas diffuse sites (20%), trunk (9%), and lower limbs (7%) were the most frequently affected sites in patch-test-negative patients.

Relevance

We assessed current relevance in 21% of positive patch-test reactions.

Discussion

Of the 117 elderly patients who were patch-tested, 48 (41%) developed at least one positive reaction. These data fit with those of other studies. Wantke and colleagues reported prevalences of positive reactions in elderly subjects of 33% and 35% for males and females, respectively; they noticed a slight decrease in the percentage of positive patch-test reactions in older patients.⁷ Piaserico and colleagues reported that 40.7% of their elderly population showed positive reactions.¹⁰

Our results suggest that an adequate selection of patients was made because it has been reported that centers with less than 50% of positive patients may be seeing a more highly selected group of patients at the end of a referral process.¹¹

We found that about two-thirds (64%) of our patients showed a dynamic pattern of increasing intensity (D2<D3). This result fits with that of Piaserico and colleagues, who found this pattern in 60% of elderly patients versus 53% of the younger population.¹⁰ The hypothesis that there could be a slower immunologic reactivity in elderly patients should be considered. In fact, human aging is accompanied by a decline in immune function (a reduction of CD3, CD4, and CD8 T cells and Langerhans' cells).^{12,13} As a consequence, the ability to react to a contact allergen may be impaired, and an additional patch-test reading between D5 and D7 should be considered.

Regarding positive haptens, we found that the leading one was nickel sulfate (13.7%). This prevalence agrees with the results found by Wantke and colleagues, who reported positive reactions to nickel sulfate in 11.2% and 12.6% of males and females, respectively.⁷ We compared these results with data drawn from 1,150 adult patients (18–64 years of age) who attended our Dermatoallergy Clinic between January 2004 and December 2006; this population was patch-tested in the same way as our sample (patients > 65 years of age). A lower prevalence of nickel sensitivity

was detected in older patients (13.7%) than was found in our adult population (24.6%).

The second hapten was potassium dichromate (11.1%). Sensitivity to this compound in our sample was higher than in Piaserico and colleagues' population (4.5%)¹⁰; it was also higher than it was in our adult population (6.9%). This could be explained by the fact that 1.8% of our older patients were construction laborers and that 0.9% were handicraft workers who worked with leather materials.

The third hapten was cobalt chloride (7.7%). There was a significant association between positive reactions to nickel sulfate, potassium dichromate, and cobalt chloride. These relationships are thought to be related to the fact that these metals are usually associated with one another. A similar prevalence of cobalt chloride sensitization was seen in our adult population (6.3%).

The fourth hapten was para-phenylenediamine (5.2%). We think that the higher prevalence of para-phenylenediamine sensitization in our sample as compared to our adult population (3.5%) may reflect the tendency of older people to use hair-dyeing formulations more often.

The fifth hapten was balsam of Peru (4.3%), sensitization to which was double that of our adult population (2.1%). This sensitivity has been reported as one of the most frequent in elderly people.¹¹

ACD was detected in 13% of our sample. ACD prevalence varies from 20.5 to 54.0% in the general population.^{11,14} Our results indicate that ACD in elderly persons is less frequent.

Conclusion

This study suggests that even if the risk of contact sensitization rises with increasing age, there is a lessened effectiveness of the immune response of the skin, associated with a lower prevalence of positive patch-test reactions and a slower time reaction pattern in elderly individuals.

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