

Patch-Test Results of an Academic Department in Izmir, Turkey

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Background: With the development of industry, the numbers of allergens are increasing, and the frequency of these allergens show variations from country to country. The aim of this retrospective study was to determine the distribution of patch-test results by age, gender, and occupation in our region.

Methods: In a retrospective study, the patch-test results of 3,017 patients were evaluated. The results were statistically examined by frequency of age, gender, and occupation. Chi-square and Fisher exact tests were used for statistical evaluation.

Results: Of 3,017 patients, 1,975 (65.5%) were female and 1,042 (34.5%) were male. Their ages ranged from 5 to 85 years (mean, 40.38 ± 14.69 years). In 944 (31.3%) patients, at least one positive reaction to an allergen was observed. The allergens that most commonly caused positive reactions were nickel sulfate (12.2%), cobalt chloride (7.1%), potassium dichromate (5.6%), and balsam of Peru (2.8%). Balsam of Peru and nickel were the most common allergens in female patients older than 45 years and in female patients younger than 35 years, respectively.

Conclusions: Nickel sulfate and cobalt chloride were found to be the most common allergens. The most frequently seen allergens were nickel sulfate (in females) and fragrance (in males).

ALLERGIC CONTACT DERMATITIS can be affected by genetic and environmental factors.¹ Patch testing is a diagnostic method for patients with allergic contact dermatitis. Contact allergies depend on several parameters. The importance of age, sex, race, and occupation has been shown in many studies.² The frequency of contact allergies shows variations from country to country and sometimes between different regions of the same country. We aimed to determine the prevalence of contact sensitizers and to investigate associations with the age, sex, and occupation of the patients.

Method

The patch-test results for 3,017 patients prediagnosed with contact dermatitis who were patch-tested between January 2000 and December 2005 were evaluated retrospectively. The prevalence of contact sensitizers and associations with the age, sex, and occupation of the patients were investigated. Allergens from an extended European

Standard patch-test series (Chemotechnique Diagnostics, Villange, Sweden), S-100 (Chemotechnique Diagnostics), and T.R.U.E. Test (Mekos Laboratories, Hillerod, Denmark) were used for patch tests.

Patch tests were not performed on patients who had been on systemic steroid or immunosuppressive therapy during the previous month and on antihistamines during the previous week. Other exclusion criteria for patch testing were pregnancy or lactation and the use of a topical steroid on the patch-test area. The patients were asked to fill out consent forms after having been given information about patch testing.

The allergens were applied to the upper back of the patients with Finn Chambers (Epitest Ltd Oy, Tuusula, Finland) adhered with tape. Patch-test sites remained occluded for 72 hours, and a reading was done on day 3. The reactions were scored according to International Contact Dermatitis Research Group guidelines.³ For the final analysis, only definitive positive (+ to +++) and negative results were considered whereas irritative and questionable results were excluded.

For age-dependent differences, patients were subdivided into five age groups (5–25, > 25–35, > 35–45, > 45–55, and > 55 years). The patients were also divided into the following occupational groups: housewife (29%); student (13%); medical staff (5.7%); office worker (23.2%); unemployed (4%); and auto mechanic, technician, hairdresser, etc (3%).

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Chi-square and Fisher exact tests were used for statistical evaluation.

Results

Of the 3,017 patients in this study, 1,975 (65.5%) were female and 1,042 (34.5%) were male. Their ages ranged from 5 to 85 years (mean age, 40.38 ± 14.69 years).

There were no positive reactions to any allergen in 2,073 patients (68.7%, 734 males and 1,339 females); 944 patients (31.3%, 308 males and 636 females [95% CI, 0.962–1.333]) had at least one positive reaction, and 653 of these (198 males and 455 females) had a positive reaction to only one allergen.

Nickel was the most common sensitizer (12.2%, $n = 368$), followed by cobalt chloride (7.1%, $n = 215$), potassium dichromate (5.6%, $n = 168$), balsam of Peru (2.8%, $n = 85$), thiuram mix (1.8%, $n = 54$), fragrance mix (1.9%, $n = 58$), and paraben mix (1.3%, $n = 18$).

There were no positive reactions to budesonide, tixocortol-31-pivalate, caine mix, or black rubber mix in any case (Table 1).

Positive reaction to fragrance was more common among men (3%) than among women (1.4%), and this difference was statistically significant ($p = .02$; 95% CI, 1,313–3,727). Positive reaction to nickel was found to be more common among women (15.2%) than among men (6.4%), and this difference was statistically significant ($p < .0001$; 95% CI, 1,985–3,449). There was no statistically significant difference in regard to other allergens and patients' sex.

Positive reaction to chloromethylisothiazolinone (Cl+Me+isothiazolinone) was mostly seen among housewives (29.5%) and office workers (27%), and the difference between these two groups combined and the other occupational categories was statistically significant ($p < .0001$). There was no statistically significant difference in regard to other occupations and positive patch-test results.

The relationship between age and balsam of Peru was statistically significant ($p < .0001$). Balsam of Peru was a common allergen for patients aged 45 to 55 years (4.1%) and patients older than 55 years (5.1%).

The relationship between age and nickel was statistically significant ($p < .0001$). The frequency of positive reactions to nickel was 16.3% in patients aged 5 to 25 years and 19.1% in patients aged 25 to 35 years.

Discussion

The frequency of allergens has been increased by the development of industry.⁴ The distribution of allergens

Table 1. Allergens and Positive Reaction Rates

Allergen	Positive Reaction Rate	
	n	%
Potassium dichromate	168	5.6
Neomycin sulfate	19	0.6
Thiuram mix	54	1.8
para-Phenylenediamine (free base)	44	1.5
Cobalt chloride	215	7.1
Benzocaine	16	0.6
Formaldehyde	41	1.4
Colophony	44	1.5
Balsam of Peru	85	2.8
PPD-black rubber mix	33	1.2
Wool alcohol	50	1.7
Mercapto mix	28	0.9
Epoxy resin	27	0.9
Paraben mix	38	1.3
4-tert-Butylphenol formaldehyde resin	45	1.5
Fragrance mix	58	1.9
Ethylenediamine dihydrochloride	21	0.9
Quaternium-15	23	0.8
Nickel sulfate	368	12.2
Cl+Me+isothiazolinone	3	0.6
Mercaptobenzothiazole	6	0.8
Thimerosal	5	0.2
Pirimin	0	0.0
Sesquiterpene lactone mix	0	0.0
Budesonide	0	0.0
Tixocortol-31-pivalate	0	0.0
Caine mix	0	0.0

Cl+Me+isothiazolinone = chloromethylisothiazolinone; n = number of patients; PPD = para-phenylenediamine.

shows variability around the world. In this study, we investigated the distribution of allergens in Turkey. In 944 of 3,017 patients (31.3%), at least one positive reaction to an allergen was observed. The allergens that most commonly caused positive reactions were nickel sulfate (12.2%), cobalt chloride (7.1%), and potassium dichromate (5.6%). These results were similar to those of two research studies performed in Turkey.^{4,5}

In a study performed in Germany, Schafer and colleagues reported that fragrance mix (15.9%), nickel (31.3%), and thimerosal (4.7%) were the most common allergens.⁶ In a study performed in Austria, nickel (20.9%), thimerosal (11.8%), and fragrance mixes (9.3%) were found to be most common allergens.² All of these studies show that the most frequent allergens can differ according to geographic area.

In the present study, the most frequent allergen was found to be nickel (12.2%). In two research studies performed in Turkey, the frequency of nickel allergy was 17.6%⁴ and 19.1%⁵; these results were higher than our result. Of interest, nickel frequency in our study was similar to that found in research performed by Schafer and colleagues (13.1%)⁶ and by Lazarov (13.9%).⁷

The frequencies of reaction to balsam of Peru (2.8%), paraben mix (1.3%), and fragrance mix (1.9%) were found to be less than those found in Europe and the United States.⁷⁻¹⁰ The reason for this difference may be the lower use of these materials in our country.

Nickel allergy was found to be more common among women (15.2%) than among men (6.4%). It has been concluded that the reason for nickel allergy among women is the use of jewelry at early ages.^{11,12} In this study, nickel positivity was detected especially among women younger than 35 years. We believe that this result is related to the use of jewelry containing nickel.

It is reported that patch-test reactivity decreases at older ages. The frequency of reaction to nickel, cobalt, palladium, and copper decrease with increasing age. The relationship between age and balsam of Peru was significant. It is reported that balsam of Peru is a common allergen in patients aged more than 70 years.² With results similar to ours, two research studies performed in our country found balsam of Peru to be the most common allergen for patients aged more than 45 years.⁵

In the present study, the frequency of nickel reaction was found to be 19.1% in patients aged between 25 and 35 years and 16.3% in those aged from 5 to 25 years. Akyol and colleagues reported that nickel positivity is significant in patients under 40 years of age, which is similar to our result.⁴

Housewives and office workers were the most patch-tested occupational groups. Cl+Me-Isothiazolinone was the most common allergen in both groups. This result may be related to detergents, shampoos, hair conditioners, several creams (e.g. skin cream, facial cream, moisturisers), lotions (hand lotions, body lotions), and mascaras. There were no statistically significant differences between other occupations and other allergens.

There were no positive reactions to budesonide, tixocortol-31-pivalate, caine mix, or black rubber mix. The results show that exposure to these allergens is uncommon in our country.

As a result of the development of industry, the number of allergens is increasing. The results of our study are similar to the results of previous studies reported in our country. But the frequency of contact allergies shows variations from country to country, and this is the result of environmental factors and exposure to various allergens.

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