

Introduction

Textile dyes have been recognized as important contact allergens (1). Most published work, however, has originated from Europe and North America, and only data from dermatological referral populations were presented. The prevalence of contact allergy to textile dyes in general population is unknown. The purpose of this study was to determine the prevalence of contact sensitization to textile dyes in a non-patient population and in eczema patients patch tested in a tertiary hospital in Beijing.

Subjects and Methods

Healthy student volunteers from Peking University were recruited by advertisement. Exclusion criteria included severe skin conditions, immunosuppressant treatment, or the use of systemic or topical corticosteroids within the previous 4 weeks. Confirmed or suspected textile allergy was neither an inclusion nor an exclusion criterion. Consecutive patients with eczema who attended Peking University Third Hospital for patch testing were also studied. All participants were Chinese Han ethnics. A local ethics committee approved this study, and oral consent was obtained from each participant.

Two hundred and five volunteers (95 men, 110 women, mean age 25.8 ± 1.5 years, range 20–27 years) and 327 patients with eczema (100 men, 227 women, mean age 36.5 ± 13.8 years, range 19–78 years) were studied. Patch tests were performed with a modified European baseline series and textile dye allergens (Chemotechnique Diagnostics, Malmö Sweden) (Table 1). Allergens were applied to the upper back and removed after 2 days. The results were observed at 2 and 4 days according to the International Contact Dermatitis Research Group (ICDRG) grading (2). After testing, the suspected causal agent was investigated by means of a written questionnaire (3).

Results

The total positivity rate for patch testing with the baseline series of allergens in volunteers was lower than that for patients (18.0% versus 43.0%, $P < 0.0001$, χ^2 -test). Six volunteers (2.9%) reacted to textile dyes, which was similar to the rate (4.0%, 13/327) in patients

with eczema ($P > 0.05$, χ^2 -test). There was no significant difference in the prevalence of contact sensitization to any allergens between volunteers and patients, or between different genders within the same group ($P > 0.05$ for all, χ^2 -test, Table 1). Past relevance was found in 2 of the textile dye-allergic volunteers, and the relevance of the other reactions was unclear. Six of 13 patients with positive reactions to textile dyes were relevant. Five textile-allergic patients also reacted to *para*-phenylenediamine (PPD), but only one had a history of hair dye dermatitis. Irritant reactions could be observed in both groups, with a frequency between 0.5% (Basic Red 46) and 3% (Disperse Red 17), and could be easily recognized according to the ICDRG grading (2).

Discussion

There is potential bias in this study, in that the sensitization rate in our volunteers may be over-represented because it is a self-selected population and those who have a history of dermatitis may take advantage of testing. However, the lower age of volunteers (20–27 years) may also lead to underestimation of the sensitization rate, as patch test positivity tends to increase with age. In spite of these limitations, it is clear that the prevalence of contact sensitization to textile dyes in Beijing is similar to those in Europe (1), and disperse dyes were the leading allergens among the textile dyes tested. Although the volunteers positive to Disperse Red 17 were outnumbered by those allergic to Disperse Blue 124, the difference was not statistically significant (Table 1). Five of 13 patients allergic to textile dyes also reacted to PPD, confirming that PPD is a marker of textile allergy (4). Interestingly, we also found that although many textile dyes gave positive reactions, only Disperse Blue 124 and Disperse Blue 106 had a positivity rate over 1.0% (Table 1).

Recently, investigations have shown that patch test preparations containing Disperse Blue 106 and Disperse Blue 124 are impure (5). Further research is necessary to identify the various sensitizers in the disperse dyes responsible for allergic reactions to textiles.

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Contact sensitization to textile dyes in a self-selected population and a dermatological referral population in Beijing

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Table 1. Prevalence (%) of contact sensitization to a series of textile dye allergens in Beijing*

Allergens	Concentration (%, w/w)	Volunteers (n = 205)			Patients with eczema (n = 327) [†]		
		Males (n = 95)	Females (n = 110)	Total	Males (n = 100)	Females (n = 227)	Total
Disperse Red 1	1.0	—	—	—	—	—	—
Disperse Red 17	1.0	3.2	0.9	2.0	2.0	0.4	0.9
Disperse Blue 3	1.0	—	—	—	1.0	—	0.3
Disperse Blue 35	1.0	—	—	—	—	0.4	0.3
Disperse Blue 85	1.0	—	—	—	1.0	0.4	0.9
Disperse Blue 106	1.0	—	—	—	4.0	—	1.2
Disperse Blue 124	1.0	1.1	0.9	1.0	4.0	—	1.2
Disperse Blue mix 106/124	1.0	—	—	—	3.0	—	0.9
Disperse Blue 153	1.0	—	—	—	—	—	—
Basic Red 46	1.0	—	—	—	1.0	—	0.3
Reactive Black 5	1.0	—	—	—	—	—	—
Reactive Blue 21	1.0	—	—	—	—	—	—
Reactive Blue 238	1.0	—	—	—	—	—	—
Reactive Red 123	1.0	—	—	—	—	0.4	0.3
Reactive Red 228	1.0	—	—	—	—	0.4	0.3
Reactive Red 238	1.0	—	—	—	—	0.9	0.6
Acid Red 118	5.0	—	—	—	2.0	—	0.6
Acid Red 359	5.0	—	—	—	—	0.4	0.3

* $P > 0.05$ for all, χ^2 -test.

[†]Thirteen patients reacted to textile dye allergens. Some patients had multiple positive reactions; therefore, the total number of positive reactions was over 13. Of the 13 patients allergic to textile dyes, five also reacted to p-phenylenediamine.

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