

Contact sensitivity to cigarettes and matches

G. DAWN, C. J. FLEMING AND A. FORSYTH

Contact Dermatitis Investigation Unit, Glasgow Royal Infirmary, Glasgow, G 4 OSF, UK

The results of patch testing with a series containing components of cigarettes and matches were reviewed. 2 years were reviewed, 1987 and 1997. 314 patients were patch tested to this series, 203 in 1987 and 111 in 1997. 31 patients had clinically relevant positive reactions to the series, 25 in 1987 and 6 in 1997. 26 patients had relevant positive tests to cigarette components in the series. There were 14 relevant positive reactions to phosphorus sesquisulfide in 1987 and one in 1997. All patients with relevant positive reactions to red match tips also had reactions to phosphorus sesquisulfide. There was a significant association between cigarette and fragrance hypersensitivity. The eczema in 3 of 4 patients who stopped smoking improved. A series containing match heads, smoked cigarette filters and remnants of tobacco from smoked cigarettes may be useful in smokers with eczema of the face, neck or hands.

Key words: smoke; cigarette; tobacco; phosphorus sesquisulfide; fragrance; hypersensitivity; eczema; allergy; allergic contact dermatitis; airborne. © Munksgaard, 1999.

Accepted for publication 4 December 1998

Allergic contact dermatitis (ACD) from phosphorus sesquisulfide (P_4S_3) in matches is well-recognised (1, 2), but allergic contact dermatitis from cigarette components is rare (3, 4). Patients attending our department since 1986 have been patch tested with a smoker's series, when appropriate. The purposes of this study were to review the use of patch testing with this allergen series, to compare the results of 1987 with 1997, and to examine the clinical suspicion that there was an association between fragrance and cigarette allergy.

Patients and Methods

All patients attending for patch testing from 1986 were tested with a smoker's series if they had eczema which could have been caused by smoking, for example, face eczema. Non-smokers were tested if passively exposed to cigarette smoke regularly, for example, those living with a smoker. The smoker's series consisted of: (i) phosphorus sesquisulfide 1% pet.; (ii) "strike anywhere" match heads as is; (iii) cigarette filter as is (referred to as unsmoked filter); (iv) cigarette paper as is; (v) cigarette ash as is; (vi) cigarette tobacco as is (referred to as unsmoked tobacco); (vii) filter from a cigarette after smoking as is (referred to as smoked filter); (viii) partially combusted remnants of tobacco from the filter end of a smoked cigarette, as is (referred to as smoked tobacco)

As is allergens were secured with petrolatum. Cigarettes were patient's own brand (name of brand not recorded), or if not available, a brand smoked by a member of the nursing staff. No patients were tested to nicotine.

1915 case notes were reviewed, 1085 from 1987 and 830 from 1997. History, clinical examination and MOAHL index were recorded. Patch test results were recorded as recommended by the International Contact Dermatitis Research Group (5). Results were categorized as clinically relevant or of unknown relevance at the time of patch testing. All readings were done by one physician (AF).

Patients with relevant positive patch tests were contacted by mail and invited to complete a short questionnaire (Box 1).

In 1998, 25 non-smokers attending for patch testing were tested to the series to assess irritancy.

Results

In all, 314 patients were patch tested to the smoker's series, 203 in 1987 (18.7% of all patch test patients) and 111 in 1997 (13.4% of all patch test patients). Overall, 31 patients (1.6% of total patch tested) had relevant positive patch tests to the series. 26 patients had reactions to cigarette components, 15 to matches and 10 to both. 25 patients with relevant positive tests were seen in 1987, and 6 were seen in 1997. Details of patients with relevant

Box 1. Questions in the questionnaire

1. *Did you consider stopping smoking when you were told you had developed allergy to cigarettes or matches?*
strongly agree agree neither agree nor disagree disagree strongly disagree
2. *Have you stopped smoking since you were told you were allergic to cigarettes or matches?*
yes no
3. *If you did stop smoking, did you notice any change in your skin rash?*
totally cleared partially cleared no change became worse

positive tests are shown in Table 1, and sites of eczema in patients with positive patch tests are shown in Table 2.

All patients, except 1, with relevant positive reactions were smokers. The exception was a bar waitress who worked in a smoke-filled environment. In smokers, the mean number of cigarettes smoked was 15 per day, and the range varied from 5 to 40 cigarettes per day. 2 pipe smokers with relevant positive tests smoked 125 g of tobacco each per week.

Relevant positive reactions to components of the smoker's series in both years are shown in Table 3. In 1987, of 203 patients patch tested to the smoker's series, 14 had relevant reactions to components of matches (7%), 21 to components of cigarettes (10%) and 10 had reactions to both (5%). 11 patients (5%) had reactions only to cigarettes in the smoker's series. In 1997, of 111 patients tested to the series, 1 had a relevant positive reaction to phosphorus sesquisulfide (1%) and 5 had reactions to cigarette components (5%).

Most of the positive patch test reactions to the series were to smoked filter, smoked tobacco and unsmoked tobacco (Table 3). No reactions to cigarette paper or unsmoked filter were seen. All patients with reactions to unsmoked tobacco and to cigarette ash also had reactions to smoked tobacco. Not all patients with reactions to smoked filter had reactions to smoked tobacco. 5 patients had 3 or more positive tests to components of smoker's series in 1987, and 1 in 1997.

In patients with relevant positive reactions to the smoker's series in 1987, 6 used matches, 10 used lighters and 8 used both matches and lighters to light tobacco. In 1997, 5 patients used lighters and 1 patient used both lighters and matches.

In 1987, there were 14 reactions to phosphorus sesquisulfide and 13 reactions to 'strike anywhere' match heads. In 1997, there was 1 reaction to phosphorus sesquisulfide and 1 reaction to 'strike anywhere' match heads. All patients with reactions to 'strike anywhere' matches also had reactions to phosphorus sesquisulfide.

Table 1. Details of patients with relevant positive patch tests to components of the smoker's series

male:female	13:18
occupational dermatosis	2
atopy	4
age range	19-81 years
mean age	48 years
duration of symptoms	3 months to >30 years

Table 2. Sites of eczema in patients with relevant positive patch tests to components of the smoker's series

Sites affected	Number with relevant positive reactions to cigarette components (26 patients)	Number with relevant positive reactions to match tips or phosphorous sesquisulfide (15 patients)
only face and neck	8	5
face and neck and other parts of body	12	6
hand only	2	3
hand and other parts of body with no face and neck involvement	4	1

Table 3. Relevant positive patch test reactions to different components of the smoker's series in 1987 and 1997

	1987 (25 patients)	1997 (6 patients)
smoked filter	10	5
unsmoked filter	0	0
smoked tobacco	11	3
unsmoked tobacco	5	0
cigarette ash	2	0
cigarette paper	0	0
red match heads	13	1
phosphorous sesquisulfide	14	1

13 of the 26 (50%) patients with relevant positive reactions to cigarette components also had reactions to fragrance mix or components of the fragrance mix. This was significantly increased in comparison with all patients with negative reactions to smoker's series in 1987 and 1997 ($n=283$, χ^2 , $p<0.01$). None of the 5 patients with positive reactions to matches, but negative reactions to cigarette components, had reactions to fragrances.

10 patients responded to the follow-up questionnaire. 1 individual recorded strong agreement, 3 recorded agreement, and 6 neither agreed nor disagreed with question one (Box 1). In responses to questions 2 and 3, 4 patients claimed to have stopped smoking since patch testing. Of these, 1 recorded complete clearance, 2 partial clearance,

and one no clearance of their skin rash after stopping smoking.

There were no allergic or irritant reactions to the series in the 25 non-smokers.

Discussion

Dermatitis due to 'strike anywhere' matches (1, 2), tobacco (6, 7) and transdermal nicotine patches (8, 9) is well-recognized, but allergic contact dermatitis from cigarettes has not been reported in detail.

It has been proposed that allergic contact dermatitis from tobacco occurs only in tobacco factory workers (7), but this study shows that consumers may also be affected. Although there was a low response rate to the questionnaire, 3 of 4 patients who stopped smoking had total or partial clearance of eczema. It may be that continual exposure to combusted tobacco can sensitize predisposed individuals, in a similar manner to smoke from burning poison ivy and related species (8).

There may be difficulty in distinguishing between allergic and irritant patch test reactions. The relevant positive reactions to the smoker's series were considered to be allergic because of the morphological appearance of the reactions and the lack of irritancy in non-smokers. In addition, the correlation with fragrance allergy suggests an allergic cause for these reactions.

The cigarette components most frequently resulting in patch test reactions were smoked filter, smoked tobacco and unsmoked tobacco. All patients with reactions to unsmoked tobacco and to cigarette ash also had reactions to smoked tobacco. No reactions to cigarette paper or unsmoked filter were observed. We would therefore recommend consideration of patch testing to patient's own smoked cigarette filters, match heads and smoked tobacco in smokers with eczema of the face, neck or hands.

The smoker's series was applied more often in 1987 than 1997. This may reflect a reduction in smoking, or a change in referral pattern to our clinic. In 1997 there were fewer relevant positive tests to match heads and phosphorus sesquisulfide. This may be due to increased use of cigarette lighters, or reduced availability of matches containing phosphorus sesquisulfide, although some

centres in the UK continue to patch test smokers who use such matches (personal communication, M. H. Beck). The proportion of smokers with relevant positive tests to cigarettes components was the same in 1987 as in 1997, and so there has been no change in the tendency for smokers to become allergic to their cigarettes.

The significant positive correlation between positive tests to cigarette components and fragrances suggests a common allergic cause, or a cross-reaction. This correlation is perhaps unsurprising, as many fragrance compounds and balsams are derived from plants. The significance of this correlation is unclear, but it is worthwhile considering cigarette allergy in smokers with unexplained fragrance reactions.

References

1. Ive F A. Studies in contact dermatitis. Matches. *Trans St Johns Hosp Derm Soc* 1967; 53: 135-140.
2. Steele M C, Ive F A. Recurrent facial eczema in females due to 'strike anywhere' matches. *Br J Dermatol* 1982; 106: 477-480.
3. Neild V. Contact dermatitis from a cigarette constituent. *Contact Dermatitis* 1981; 7: 153-154.
4. Lovell C R, White I R. Allergic contact dermatitis from tobacco in a consumer. *J Royal Soc Med* 1985; 78: 409-410.
5. Wilkinson D S, Fregert S, Magnusson B et al. Terminology of contact dermatitis. *Acta Dermato-venereologica* 1970; 50: 287-292.
6. Rycroft R J G. Tobacco dermatitis. *Br J Dermatol* 1980; 103: 225-229.
7. Rycroft R J G, Smith N P, Stoke T, Middleton K. Investigation of suspected contact sensitivity to tobacco in cigarette and cigar factory employees. *Contact Dermatitis* 1981; 7: 32-38.
8. Bircher A J, Howald H, Rulfi T. Adverse skin reactions to nicotine in a transdermal therapeutic system. *Contact Dermatitis* 1991; 25: 230-236.
9. Vincenzi C, Tosti A, Cirone M, Guarrera M, Cusano F. Allergic contact dermatitis from transdermal nicotine system. *Contact Dermatitis* 1993; 29: 104-105.
10. Mitchell J, Rook A. *Botanical dermatology*. Vancouver: Greengrass, 1979: 63-97.

Address:

C. J. Fleming
Department of Dermatology
Western Infirmary
Glasgow G11 5EA
UK