

Colophony in Mascara as a Cause of Eyelid Dermatitis

Chemical Analyses and Patch Testing

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Contact allergy to various components in cosmetics may cause eyelid dermatitis. Of 8 mascaras analysed with High Performance Liquid Chromatography (HPLC), 3 contained colophony. Patients with contact allergy to colophony showed positive patch test reactions when tested with the two mascaras with the highest content of colophony. One mascara without colophony but containing nickel, gave positive reactions in persons with contact allergy to nickel. Key words: Rosin; Nickel; Contact allergy; Cosmetics.

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Eyelid dermatitis may be caused by endogenous or exogenous factors (1). A well-known exogenous factor is contact allergy to components in cosmetics (1–3). Allergic contact dermatitis due to colophony in mascara, eyeshadow, rouge and lipstick has been reported (4–8). Colophony is used in cosmetics to make the pigment stick to the areas to which it is applied. It is a widespread material obtained from pine trees and a frequent cause of contact allergy (9).

The aim of the study was to investigate the content of colophony in mascara of different brands on the Swedish market. Products stated to be hypoallergenic or non-irritating were compared with products not so described. Mascara containing colophony was investigated concerning its ability to provoke patch test reactions in patients with known colophony contact allergy.

MATERIAL AND METHODS

Black mascara of different brands, some expensive and some cheap, common on the Swedish market, was analysed regarding content of abietic acid (AbA), the main component of colophony. Eight different mascaras were analysed, 5 of which were stated by the manufacturer to be hypoallergenic or non-irritating (Table I). The total number of

mascara brands on the Swedish market in 1990 was estimated by the distributors' organisation to be 60. A High Performance Liquid Chromatography (HPLC) method, previously described in detail, was used for analysis (10). With this method, the lowest detectable amount of AbA is 0.001%, corresponding to a content of about 0.003% unmodified colophony in the product.

Thirteen female patients with known contact allergy to colophony of the gum rosin type were tested with 3 brands of mascara. They were also tested with colophony of the gum rosin type 10% in petrolatum as a positive control. All the patients but one confirmed problems with mascara. The testing was performed according to the standard procedure using Finn Chambers™ (Epitest, Finland) and Scanpor™ (Norgesplaster, Norge) (11). The patches were removed after 48 h and readings were taken 72 h after application. The minimum criterion for a positive reaction was erythema and infiltration. The mascaras were applied both "as is" and 75% in petrolatum. Eleven female volunteers without contact allergy to colophony were used as controls.

Analyses of nickel, chromium and cobalt content were performed by Analytica AB, Täby, Sweden, using atomic absorption spectrophotometry on 2 samples of the mascara from Clinique.

RESULTS

Results from the analyses of colophony content in the mascaras are shown in Table I. Abietic acid was detected in 3 of 8 products analysed. Of the mascaras tested in patients, the products from Lancôme and Biotherm contained colophony, while no colophony was detected in the Clinique product. Metal analyses of the Clinique mascara showed a content of 21 µg/g of nickel and 4.7 µg/g of cobalt for sample one, and 78 µg/g of nickel and 1.5 µg/g of cobalt for sample two. The chromium content was <10 µg/g in both samples.

Eleven of 13 patients allergic to colophony were patch-test-positive to the colophony-containing mascaras from Biotherm and Lancôme. No difference was found between the reactions to these mascaras tested "as is" and 75% in petrolatum (Table I). Among the controls, no reactions were found to the mascaras containing colophony. Five of 8 persons with known contact allergy to nickel (3 patients and 2 controls) reacted to the Clinique mascara (75% in

Table I. Colophony content in some mascaras on the Swedish market according to HPLC analyses of abietic acid (AbA), the main component of colophony.

Results from patch testing with 3 of the analysed mascaras in patients with contact allergy to colophony, and in controls.

Mascaras	Chemical analyses		No. of pos. patch test reactions			
	AbA (%)	Colophony (% ^a)	Patients (n = 13)		Controls (n=11)	
			"as is"	75% in pet.	"as is"	75% in pet.
1. Immensils™ Mascara crème (Lancôme, France)	1.14	3	11	11	0	0
2. Biotherm Bio Mascara (Biotherm Distr. et Cie, France) ^c	1.08	3	10	11	0	0
3. Clinique Glossy Brush-On Mascara (Clinique, France) ^d	n.d.	–	0	3 ^b	0	2 ^b
4. Big Brush™ (Revlon, France)	0.017	0.05	n.t.	n.t.	n.t.	n.t.
5. Special Eyes™ (Revlon, France) ^e	n.d.	–	n.t.	n.t.	n.t.	n.t.
6. Jane Hellen Creme mascara (Elida Robert, Sweden)	n.d.	–	n.t.	n.t.	n.t.	n.t.
8. Max Factor Sensitive Eyes™ (Max Factor, England) ^f	n.d.	–	n.t.	n.t.	n.t.	n.t.
9. Invite™ (General Cosmetics B. V., The Netherlands) ^f	n.d.	–	n.t.	n.t.	n.t.	n.t.

pet. = petrolatum, n.d. = not detectable, – = analysis not performed, n.t. = not tested

a) Calculated from AbA found by analysis. b) Persons with contact allergy to nickel. c) "Dermatologically and ophthalmologically tested and non-irritant". d) "Allergy tested". e) "Non-irritating". f) "Hypoallergenic". [c – f] = Statements according to producers].

petrolatum). No reaction to this product was obtained in the patients allergic to colophony unless they had a contact allergy to nickel as well.

DISCUSSION

Eyelid dermatitis caused by colophony in mascara has been reported (4, 5), but it is considered rare (3, 12). In this study colophony was detected in 3 of 8 mascaras common on the Swedish market. The producer claimed that one of the colophony-containing products was most carefully tested regarding harmful ingredients. All of the patients with known contact allergy to colophony reacted to one or both of the mascaras containing colophony. Two of the patients had weak positive reactions with erythema and infiltration, while the remaining had strong reactions

with papules or vesicles. Although only a few of the approximately 60 brands of mascara on the Swedish market were examined, it was shown that both expensive products and products stated to be especially allergy-tested can be bad choices from a dermatological point of view. The mascaras from Lancôme, Biotherm and Clinique are among the most expensive in Sweden. The Biotherm mascara has a high colophony-content although stated by the producer to be both dermatologically and ophthalmologically tested and non-irritating.

Positive test reactions to the Clinique mascara were found in persons with contact allergy to nickel. Analyses of the metal content revealed both nickel and cobalt in the product. The metals might originate from the pigment or from the metal cylinder in which the mascara was kept. Eyelid dermatitis due

to nickel in cosmetics has been described previously (4, 13, 14). The figures on nickel content in mascaras and eyeshadows given in these studies accord with our own results. The underlying reason why some patients with known contact allergy to nickel did not react to the nickel-containing mascara may be false-negative results: the thick skin of the back does not react as easily as the thin skin of the eyelids (2).

The mascaras were tested both "as is" and 75% in petrolatum, because a concentration of 100% has been considered to give irritant reactions (12). In the colophony-containing products no difference was found and neither of the patches gave irritant reactions. Some irritation was found to the mascara from Clinique tested "as is". The reactions suggested to be due to the nickel content were found only with the mascara tested 75% in petrolatum. This result indicates that testing mascara in petrolatum has some advantage compared to testing "as is".

Patients may wrongly blame other environmental factors when eyelid dermatitis is caused by cosmetics. For example, a patient with severe facial dermatitis who blamed her visual display unit was found to be allergic to colophony in her cosmetics (15).

All the patients but one confirmed problems with mascara. Some never used mascara due to earlier experience of eyelid dermatitis, while others had used different mascaras until they found a product that did not cause eczema. Women in general, and especially those with contact allergy and atopic dermatitis, know that the use of cosmetics might be accompanied by certain skin problems. Therefore, a product that is not tolerated will generally be thrown away. The real number of reactions to cosmetics is thus unknown. In the USA (5), dermatologists are recommended to instruct colophony-sensitive patients to read the cosmetic ingredient labels to avoid products containing colophony. This is not possible in Europe, since ingredient labelling is not imposed. This would be very beneficial, since, as we have shown, manufacturers' statements on hypoallergenicity can be inaccurate.

The metal reactions were not fully investigated, since the aim was to give a brief report on the risks of eyelid dermatitis due to colophony in mascara. A

more profound investigation of the intolerance of cosmetics due to metal allergy is therefore planned.

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