

Allergic contact cheilitis due to carvone in toothpastes

Monica Corazza, Arianna Levratti and Annarosa Virgili

Department of Clinical and Experimental Medicine – Section of Dermatology, University of Ferrara, Ferrara, Italy

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Case Report

A 68-year-old nonatopic woman presented with a desquamative fissured cheilitis of 4 months' duration. There was no correlation between the cheilitis and previous dental procedures, and she denied having used cosmetic labial products.

Patch tests with the Italian SIDA-PA standard series, fragrance series and dental series were all negative. Further patch tests with the patient's own toothpastes, Colgate® and AZ protezione carie®, tested as is, were + D2/+ + D3 in both cases. We therefore carried out patch tests with a series of allergens frequently responsible for cheilitis, as obtained from the literature (Table 1). We also tested sesquiterpene lactone mix and Compositae mix (both negative).

A strong positive reaction to carvone having been observed when testing with the cheilitis series, thin layer

chromatography (TLC) on silica gel, using ethyl acetate and cyclohexane 1 : 3 as eluents, was carried out on both toothpastes and on a sample of commercial standardized carvone 5% pet., the allergen previously used for patch testing. This confirmed the presence of carvone in both toothpastes. Subsequently, gas chromatography allowed us to evaluate the presence of carvone quantitatively in the 2 toothpastes; the concentration of carvone was higher in the Colgate toothpaste than in the AZ.

With avoidance of both toothpastes, the cheilitis disappeared in a few weeks.

Discussion

Allergy to toothpastes is quite rare even though they contain a variety of allergens, including bactericidal agents, preservatives and flavourings (1, 2). Sensitivity to toothpastes can cause cheilitis, circumoral dermatitis, oral lichenoid reactions or burning mouth syndrome (2–4).

In a series of patients, toothpastes were the most frequent cause of allergic contact cheilitis in males. In females, toothpastes were responsible for only 21% of cases of cheilitis, lip cosmetics being their most frequent causes (5).

L-Carvone (C₁₀H₁₄O) is the main constituent of spearmint oil (*Mentha spicata*), and is also a constituent of other volatile oils like those from dill and caraway seed. Carvone is also an oxidation product of *d*-limonene, the

main constituent of volatile oils from some citruses. Furthermore, L-carvone has also been isolated from the volatile oil of *Chrysanthemum balsamita* L and its isomer, D-carvone, from mugwort (*Artemisia vulgaris* L), both these being members of the Compositae family. Due to its spearmint-like odour, carvone is used as a flavouring in many products, such as candies, chewing gums, mouthwashes and toothpastes.

Allergy to carvone (the most allergenic constituent of spearmint) does not seem to be frequent (2, 5–7). However, an unexpectedly high rate of positivities was found by Paulsen (8) in a series of consecutive eczema patients tested with L-carvone, included in a standard series of allergens. A statistically significant association was found between allergy to sesquiterpene lactones and carvone, which was explained by carvone being a terpene also found in oils from Compositae plants. We did not observe such an association in our patient. Peppermint oil (in the fragrance series), menthol (in the cheilitis series) and D-limonene were also negative.

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Table 1. Cheilitis series: patch test results

Allergens	D2	D3
carvone 5% pet.	+	+ +
limonene S 2% pet.	–	–
rosemary oil 5% eth.	–	–
limonene R 2% pet.	–	–
anethole 5% pet.	–	–
sodium benzoate 5% pet.	–	–
azulene 1% pet.	–	–
propyl gallate 1% pet.	–	–
thymol 1% pet.	–	–
menthol 1% pet.	–	–
sorbic acid 2% pet.	–	–
propylene glycol 5% pet.	–	–
benzalkonium chloride 0.1% pet.	–	–
ammonium persulphate 2.5% pet.	–	–
chloroacetamide 0.2% pet.	–	–

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- Address:
Monica Corazza
Dipartimento di Medicina Clinica e Sperimentale-Sezione Dermatologia
Università di Ferrara
Via Savonarola 9
44100 Ferrara
Italy
Tel: +39 532 205825
Fax: +39 532 206791
e-mail: czm@unife.it