

## LETTER TO THE EDITOR

## CONTACT ALLERGY TO LIMONENE FROM A HOME-MADE COSMETIC

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**Contact allergy to fragrances is very common. It is the second sensitizer in contact allergic dermatitis, after nickel sulphate. The fragrance mix and Balsam of Peru affects about 50-80% of patients affected by fragrance allergy, but the study of recent literature highlights new markers implicated in the pathogenesis of this dermatitis. We report an unusual case of contact allergy to limonene in a young woman after daily use of a self-made cosmetic product containing lemon juice and peel (rich in limonene), with a positive reaction to Balsam of Peru to patch test and a positive reaction to patch by patch performed with her cosmetic and lemon peel. This simultaneous sensitization has been previously described in literature.**

R-(+)-limonene is an ubiquitous allergen in our environment. It is one of the most widely used fragrance materials not only in fine fragrances but also most often incorporated in domestic and occupational products. It is the main constituent of peel oil from citrus fruits (95%), together with other terpenes, mainly myrcene (1). Although the non-oxidized R-(+)-limonene itself is not allergic, it easily forms allergenic products (such as limonene oxide, limonene hydroperoxides, and R-(-)-carvone) due to autoxidation during handling and storage. Clinical aspects suggest that oxidized limonene is an ubiquitous allergen involved also in occupational allergic dermatitis (2).

Allergic contact dermatitis to citrus fruit is unusual and has been mostly described in subjects who are exposed to it daily for their work (e.g. cooks, bartenders, persons involved in citrus growing and packaging) (1-3).

Concomitant reaction to citrus oil components and perfume components, such as fragrance mix,

colophonium and mainly Balsam of Peru (BP), have been described in literature (4, 5).

#### Case report

A 32-year old woman was referred to our attention for a 4-month history of intensely itchy eczematous eruption on the side of her face, including the periorcular region. She denied any relevant medical past medical history or medications. Clinical examination was unremarkable at our consultation. A detailed anamnesis revealed that she made daily use of a home-made citrus-based cosmetic for her seborrheic skin. We therefore performed patch test with North-America standard series, read at 48 and 72 hours. A strong positive (vesicular) reaction to Balsam of Peru was noted in this patient at 48 and 72 hours. The patient was also tested with a patch by patch containing her home-made preparation and one containing lemon peel, rich in d-limonene, and after 48 hours we registered a positive (vesicular) reaction at the sites of application of these agents.

*Key words: contact allergy, limonene, fragrance mix, Balsam of Peru, cosmetic, patch tests*

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Therefore, we asked the patients to stop the application of this product. The patient referred also chronic gastrointestinal symptoms, such as abdominal distension and pain after eating, associated to episodic diarrhoea.

We prescribed her a topical therapy with corticosteroids and emollients for a week, and we recommended her to avoid also eating foods that cause an allergic cross-reaction with Balsam of Peru, such as products that contain citrus fruits, flavouring agents such as those found in Danish pastries and other bakery goods, candy, and chewing gum, spices such as cinnamon, cloves, vanilla, curry, allspice, anise, and ginger, spicy condiments, wine, beer, gin, and vermouth, perfumed or flavoured tea and tobacco, such as mentholated tobacco products, chocolate, certain cough medicines and lozenges, ice cream, Cola and other spiced soft drinks, pizza, Italian and Mexican foods with red sauces, tomatoes and tomato-containing products. After two weeks we made a clinical control and we noted a resolution of described dermatitis and an improvement of her gastrointestinal symptoms. These results refer to a follow-up of ten months.

## DISCUSSION

Contact allergy dermatitis is an immune-mediated disease characterized by type IV reactions according to Gell and Coombs classification. Several materials are considered responsible for this dermatitis and the diagnosis is made with a correct anamnesis and Patch test (6).

Contact allergy to fragrances, besides nickel allergy, is the most common hypersensitivity amongst dermatitis patients. The fragrance mix and Balsam of Peru are estimated to detect 50-80% of all cases with fragrance allergy, but new markers have to be identified and introduced for screening in dermatitis patients (1). Furthermore, simultaneous reactions to fragrance mix (cinnamic aldehyde, cinnamic alcohol, geraniol, hydroxycitronellal, isoeugenol, eugenol), colophonium and balsam of Peru in dermatitis patients are registered in literature; and, many subjects allergic to perfume components react to multiple allergens, such as also limonene (4, 5). Balsam of Peru (the *Myroxylon pereirae* (MP) resin) is a natural resin that exudes from the trunk of the tree MP after

the scarification of the bark. It is constituted by a number of substances, mainly cinnamal or cinnamic aldehyde. Its extracts and distillates are contained in many cosmetics. Foods can also contain substances closely related or identical to it (e. g. marmalade, juice and bakery products with peel of citrus fruits, tomato sauce, flavours in wines, tea, soft drinks, tobacco, spices like cinnamon and curry) (4). Thus, positive reactions to these allergens may indicate the possibility of experiencing systemic contact dermatitis from balsam-related foods and spices. In literature there are some studies that support the value of a balsam-restricted diet in those with a positive patch test to BP, especially in the absence of other significant patch test findings: in 1983, Veien et al. noted that 5 of 9 patients (55%) with chronic eczema and with a positive oral challenge to BP had complete relief after being placed on a balsam-restricted diet; in 1985, Veien et al. reported that 16 of 31 patients (52%) with positive BP oral challenge had marked or complete improvement on the diet. Looking at patients with positive patch tests to BP, he noted also that 15 of 24 (63%) had long-term improvement on the diet; again in 1996, he noted 9 of 14 (64%) had long-term benefit from the diet (7).

The non-oxidized R-(+)-limonene itself is not allergic, but it easily forms allergenic products (such as limonene oxide, limonene hydroperoxides, and R-(-)-carvone) due to autoxidation during handling and storage. Allergic contact dermatitis to citrus fruit is unusual and has been more described in subjects that are exposed to daily contact with this sensitizer substance for their work (e. g. cooks, bartenders, persons involved in citrus growing and packaging) (1-3).

Some studies in literature are in favour of this concomitant sensitization among perfume mix and limonene: Hjorth in 1961 demonstrated that hand contact dermatitis provoked by contact with orange peel was associated to positive patch testing to MP (8); Johansen and coll. in 1997 showed that individuals with previous rash to citrus fruits have more chance of being allergic to MP (9). It has also been verified by Avalos-Peralta et al. that there is an important association between work in the food industry (mostly of citrus fruits) and allergy to MP (4). Also, Matura et al., in 2002 noticed in their study a high number of concomitant reactions to FM,

balsam of Peru and colophonium in the patients with positive reactions to oxidized limonene compared with those who were negative (2).

Such variations in sensitization to fragrance materials are not rare and, besides specific patient referral or selection, they can be explained by local habits in the use of cosmetics. For example, fragrances with citrus notes have much larger market shares in Spain compared with other countries. The extensive use of citrus peel in the household setting and the use of homemade, citrus-based cosmetics can also explain the high frequency of allergic reaction in Seville (4).

In our case, we based the diagnosis on: the positive reaction to patch by patch containing the self-made cosmetic and lemon peel; the positive reaction to Balsam of Peru, previously well documented in literature, and on the positive clinical response when patient did not apply this emulsion.

We report this case because it describes a lime dermatitis that is unusual as it occurred in an individual with no occupational exposure to citrus fruit and because of gastrointestinal symptoms that disappeared after an avoiding diet. We would also remember the importance of identifying and introducing new markers for screening in dermatitis patients, according to the increasing incidence of allergic contact dermatitis described in the last decades.

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