

Short Communication

Phototoxic contact dermatitis from 5-methoxypsoralen in aromatherapy oil

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Bergamot (*Citrus bergamia*) oil is obtained from the rind of small orange-like fruits native to Italy. It is obtained by expression when the fruits have almost yellowed. Its light citrusy aroma, in addition to long-standing use in the cosmetic industry and to flavour tea, is used in aromatherapy. The essential oil of bergamot contains various compounds, including the furocoumarins citropten (5,7-dimethoxycoumarin (5,7-DMC)) and bergapten (5-methoxypsoralen (5-MOP)) (1). In combination with exposure to sun, bergamot oil stimulates melanogenesis (2), hence potentially protecting the skin against erythema and even cutaneous cancers (photochemoprotection) (3). However, both citropten and bergapten are known to be photomutagenic (4, 5) and phototoxic, bergapten being the more toxic.

Until recently, 5-MOP was frequently used in suntanning preparations. The status of 5-MOP in the EU is currently being discussed, though there is already an unofficial ban in the UK on its use in sunscreen products. IFRA recommends in its code of practice that, when used for application on areas of skin exposed to sunshine, excluding bath preparations, soaps and other products that are washed off the skin, bergamot oil should not be used in consumer products at above 0.4%. Major manufacturers of perfumes comply with the IFRA code of practice which limits 5-MOP to 75 ppm in perfume, and distil oil of bergamot to substantially remove 5-MOP (6). 8-MOP is prohibited in cosmetic products except the natural content of essences.

Case Report

Whilst adding bergamot aromatherapy oil to her bath, a 10-year-old girl spilt it onto her hands and into the water. She subsequently got into the bath. The day was sunny and she spent most of her time outside. The following morning, she woke with a blistering eruption on her hands and in a linear pattern along her forearms. Her thighs and lower legs which, when kneeling in the bath, had come into contact with the bergamot-contaminated water, were also affected, with a clear cut-off

margin at mid-thigh level. The upper thighs, abdomen, chest, face, and neck, which had not come into direct contact with the water, were spared. She was treated with oral prednisolone and advised to avoid further sun exposure. A potent topical corticosteroid was applied 2× daily. After one week, the eruption had settled completely.

The concentration of bergamot in the oil was not specified. The information leaflet accompanying it gave no indication of possible side-effects, but simply commented that 'As bergamot increases the photosynthesis of the skin, it is advisable not to use it directly or undiluted as it may cause pigmentation.' Gas chromatography/mass spectrophotometry subsequently confirmed the presence of 5-MOP within the bergamot oil. Analysis of the bergamot aromatherapy oils of two different manufacturers failed to identify psoralen.

Discussion

To our knowledge, this is only the 2nd case reported which highlights phototoxicity due to bergamot in aromatherapy oil (7). Minor burns have also been reported after the use of lemon oil in a sauna room, the major component of lemon oil being 5-MOP (8). There are 2 case reports of women with 2nd degree skin burns following UVA exposure after use of oral or topical methoxalene (9). In both cases, as in our case, onset was not apparent until 20 h after exposure. Phototoxic effects depend on both the psoralen concentration and also on the UVA dose and can thus be decreased by sunscreens (10).

Phototoxic reactions to 8-MOP usually occur following topical application (11), but may occur after oral 8-MOP (12). Though psoralens occur in many plant species, previous reports on adverse reactions to 8-MOP or 5-MOP (with the exception of 1 patient with intolerance to lime juice) have not included comments on intolerance to naturally occurring furocoumarin-containing foods (13–15). Contact allergy to 5-MOP and 8-MOP is relatively rare (16). Some studies have shown no significant absorption of 5-MOP and 8-MOP, while others have demonstrated that it appears to be proportional to the quantities applied (17). In skin sensitized by 8-MOP and exposed to 395-nm UVA, unbound psoralen did not

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contribute to photosensitivity at 24 h after topical application (18). After topical application of 8-MOP, increase in intravascular permeability or polymorphonuclear accumulation is clearly demonstrable at 2 h, but intense erythema does not occur until 24 h (19). Psoralens may form 2 types of adducts to DNA, the monoadduct and the interstrand crosslink. Up to 2 weeks after sensitization, a sufficient number of psoralen monoadducts is present in the sensitized skin for elicitation of phototoxic erythema via psoralen-DNA cross-link formation (18).

Despite the increasing popularity of aromatherapy, unlicensed products are thought to account for over 80% of herbal sales. Herbal products may still be sold without any objective product information on the packaging (20). Some may be contaminated with undeclared toxic botanicals, heavy metals, or pharmaceuticals (21); thus, the user may remain unaware of potential adverse effects.

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