

Occupational allergic contact dermatitis from lichens in present-day Finland

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Lichens are abundant in forests, living on trees, soil, stones and rocks. They contain usnic acid and other lichen acids that are contact allergens. Lichens and liverworts cause woodcutter's dermatitis, eczema that appears in the forest on the bare skin areas, especially in cold and wet weather. Occupational allergic contact dermatitis from lichens occurs in forestry and horticultural workers and in lichen pickers. Lichens can cause immediate allergy, contact urticaria, rhinitis and asthma and probably also photoallergic contact dermatitis. Lichens are used for the manufacture of oak moss absolute, a fragrance constituent. Oak moss absolute contains lichen acids and is one of the commonest contact allergens. Lichen acid allergy develops either from contact with lichens or from fragrances. We describe 4 cases of occupational allergic contact dermatitis from lichens during the past decade: 2 were farmers and 2 gardeners. 3 of them had allergic reactions to fragrance mix and oak moss absolute. Lichen contact allergy is an old, partly forgotten, syndrome that should be remembered for symptoms in contact with barked wood or wood dust.

Key words: contact allergy; farming; firewood; forestry; gardener; oak moss; occupational.
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Accepted for publication 1 November 2004

Lichens are plants composed of fungi living in symbiosis with algae (1). There are about 19 000 species of lichen in the world and about 1500 in Scandinavia (2). Lichens are found everywhere and they are plentiful in temperate zone forests, living on trees, soil, stones and rocks (2).

Silver moss or reindeer moss (*Cladonia alpestris/stellaris*) is used in flower arrangements, funeral wreaths and Christmas decorations, for toy trees in miniature railways (3) and its extracts in medical preparations. Many lichens can be used for dyeing wool (2). The oak moss perfumes are made mainly of *Evernia prunastri* (oak moss) and *Pseudoevernia furfuracea* (tree moss) by extraction (2). Oak moss extracts are added to many perfume mixtures, particularly to after-shave lotions (2). Usnic acid, a lichen constituent, has been used in deodorants because of its antibiotic properties (3).

In 1965, Mitchell discovered that allergic contact dermatitis from lichens is caused by allergy to usnic acid, a lichen acid. It accumulates in these plants to up to 5% of their dry weight (1). Lichens also contain other lichen acids, such as atranorin and evernic acid, which are contact allergens (4). Patients with lichen acid allergy are often photo-sensitive (4, 5, 6), and positive photopatch tests to

lichens (6) and lichen acids (4, 6, 7, 8) have been observed, but their clinical relevance is usually not clear (6). Immediate allergy to lichens with skin and respiratory symptoms in combination with algae sensitivity has also been described (9).

Allergic contact dermatitis from lichens is primarily seen in forestry (1, 5) and horticultural work (9), but it may be associated with all kinds of outdoor activities (4) like hunting (5) and picking berries (5) and contact with living trees (10), firewood (5), wood dust (11) or other barked wood (4, 5, 9). Lichens can also cause airborne contact dermatitis, which may simulate photo-dermatitis (4). In Finland, lichen picker's dermatitis caused by *Cladonia alpestris* has been described in 9 patients (6).

Case Reports

Patient no. 1

Patient no. 1 was a 51-year-old farmer with a history of childhood atopic dermatitis. He had worked on his farm since 1978, first tending dairy cattle. He developed protein contact dermatitis from cows. After a change to beef cattle, his symptoms were milder. In 1996, he gave up cattle

farming and concentrated on forestry and the cultivation of oats and barley. In recent years, he had had dermatitis on his face, neck and arms when in the forest. The symptoms appeared especially in cold and wet weather. He had had no eczema from deodorants or after-shaves. Patch tests results (2003 and 2004) are summarized in Table 1.

Patient no. 2

Patient no. 2 was a 49-year-old female farmer with a 21-year history of hand and face dermatitis. In the cow house, water was warmed with firewood that was occasionally covered by lichens. In the summer, she regularly went to the forest to check up on the cows. Patch tests were performed in 1997 and 1998 (Table 1).

Patient no. 3

Patient no. 3 was a 52-year-old gardener with no medical history of atopy. In 1997 during training, she had eczema on her fingers. In 1999 while working as a gardener, the eczema worsened and she also developed eczema on her face. She had exacerbations when handling tulips and lichen during the Christmas season. Patch test results are summarized in Table 1.

Patient no. 4

Patient no. 4 was a 28-year-old female gardener with a history of allergic rhinitis and asthma. She had had dermatitis in contact with deodorants and nickel-containing metals. In 1997 during training, she developed eczema on her hands when handling chrysanthemums in the autumn and when making lichen wreaths during the Christmas season. The contact with lichens was of short duration. Results of patch tests in 1992 and 1994 are summarized in Table 1.

Discussion

The symptoms of patient no.1, i.e. the eczema appearing on bare skin areas during forestry work especially in cold and wet weather, are typical of woodcutter's disease (10, 12). Woodcutter's dermatitis is caused by either liverworts (*Frullania*) or lichens (11). Liverworts are rare in Finland, and patient no.1 did not react to sesquiterpene lactone mix or Compositae mix. His diagnosis was occupational allergic contact dermatitis from lichens. Patient no. 2 heated water in the cow house $\times 2$ a day with firewood. Her occupational allergic contact dermatitis was partly due to the lichens on the firewood and partly to Compositae impurities in the flour

Table 1. Patch test results

Allergen	Patient number			
	1	2	3	4
Lichen acid mix 0.3%	++	++	++ ^a	++
Atranorin 0.1% petrolatum (pet.)	++	NT	NT	++ ^a
Evernic acid 0.1% pet.	++	NT	+ ^a	–
Usnic acid 0.1% pet.	–	NT	++ ^a	–
Fragrance mix 8% pet.	++	?+	+	+++ ^a
Oak moss absolute 2% pet.	++	?+	++	+++ ^a
Colophonium 20% pet.	+	+	–	++ ^a
Myroxylon pereirae resin 25% pet.	–	–	–	+ ^a
Propolis 10% pet.	–	–	–	+
Own lichen(s)	+ / +++ (8 samples)	+++ ^a (2 samples)	+ ^a	NT
Ultrasound extracts of own lichens	+ / +++ (8 samples)	NT	NT	NT
Own flour	NT	+++	NT	NT
Nickel sulfate 5% pet.	–	–	–	++
Thimerosal 0.1% pet.	NT	+++ ^a	–	–
Arnica, <i>Arnica montana</i> 0.5% pet.	NT	+++	–	–
Golden rod, <i>Solidago virgaurea</i> 1% pet.	NT	+++	NT	–
Mugwort, <i>Artemisia vulgaris</i> 10% pet.	NT	–	NT	++
Stinking dog fennel, <i>Anthemis cotula</i> 1% pet.	NT	–	NT	++
Carnation, <i>Dianthus sp.</i> hybr. 10% pet.	NT	–	NT	+
Sunflower, <i>Helianthus annuus</i> 2.5% pet.	NT	–	NT	+
Elecampane, <i>Inula helenium</i> 0.1% pet.	NT	–	NT	+
Sticky elecampane, <i>Inula viscosa</i> 1% pet.	NT	–	NT	+
Legion of honour, <i>Tagetes sp.</i> hybr. 10% pet	NT	–	NT	+
Own alstroemeria	NT	++	++ ^a	NT
Alpha-methylene- γ -butyrolactone 0.01% pet.	–	–	+ ^a	NT

NT = not tested.

^aTested in a local hospital.

used for animal feed. Patient no. 3 had an occupational allergic contact dermatitis from tulips and lichens.

Besides usnic acid, atranorin and evernic acid are common lichen acids causing contact allergy. Lichen acid mix contains these 3 allergens, and it is used for screening lichen allergy. Oak moss absolute also contains these 3 lichen acids. Oak moss absolute, in turn, is one of the 8 ingredients of the fragrance mix. 3 of our 4 patients had strong allergic reactions to fragrance mix and oak moss absolute. Patient no. 4 was considered to have non-occupational allergic contact dermatitis to oak moss absolute, and her eczema upon occupational contact with lichens was an exacerbation of this allergy. The other 2 patients with allergic reactions to fragrance mix and oak moss absolute did not have typical symptoms of fragrance allergy; hence, we concluded that they had been sensitized to lichen acids by contact with lichens.

Clinical lichen allergy is considered to be rare (3). Allergic reactions to fragrance mix, on the other hand, are common all over the world (13). Oak moss is nowadays the most frequent sensitizing constituent of the fragrance mix, accounting for almost 40% of positive reactions (14, 15). Oak moss sensitivity can derive from contact with either perfumes or lichens. There are no studies on the prevalence of symptoms due to contact with lichens in Finland or in any other country. Timber harvesting is nowadays usually done with big automatic machines requiring very little skin contact with the wood itself. Woodcutter's dermatitis is an old syndrome, which has been partly forgotten as the number of woodcutters has decreased. Neither are lichen pickers very numerous in Finland. The sources of lichen contact other than *Cladonia alpestris*, like handling firewood and exposure to dust from barked wood, are not always recognized. Occupational exposure to lichens is not common in present-day Finland, but non-occupational exposure has not disappeared. There are numerous firewood-heated saunas and summer cottages in Finland, and many Finns spend their free time in outdoor activities such as picking berries and mushrooms and cutting wood. Recently in 2004, we have seen 2 patients with previous dermatitis from non-occupational lichen contact. The first patient was sensitized to atranorin and usnic acid from cutting and handling firewood. The other patient had non-

occupational allergic contact dermatitis from oak moss in after-shave lotions. He had exacerbations of his hand dermatitis when handling firewood or trees in the forest, and he had allergic reactions to atranorin and evernic acid on patch testing. As oak moss absolute is among the most frequent contact sensitizers, allergic contact dermatitis from lichen contact may be quite common.

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