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RESEARCH

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Contact Hypersensitivity to Lavender Oil in Hungary: a Multicentre Survey 2013-2014

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Abstract:

Background: Lavender has been used for centuries, but its exposure has become part of the everyday life in our days. It is used in the alternative medicine, and as a flavouring component in soaps, cosmetics and in food products (chocolate, ice-cream, spices). The increasing number of exposures resulted the appearance of hypersensitivity- reactions.

Objectives: A survey on the prevalence of lavender hypersensitivity was conducted by the *Contact Dermatitis Work-Group* of the *Hungarian Dermatological Society* in a multicentre, prospective study.

Patients and Methods: 1509 consecutive dermatological patients of 7 dermatological centres were involved in this study. Results were based on the analyses of age distribution and characteristic clinical signs of the patients, on symptoms-localization, and on relevance of positive skin lavender oil test results as well as other associated contact hypersensitivities.

Results: We detected 8 patients with lavender hypersensitivity (0.53%). Typical localisations of skin symptoms were face, eyelids and hands. Associated hypersensitivity to fragrance and balsam components were not detected.

Conclusion: The lavender hypersensitivity of our patients couldn't be detected by fragrance screening allergens. The use of lavender oil in cosmetics and foods is very popular. The different types of contacts may result further increase of the sensitivity rate worldwide.

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Introduction

There are numerous species of lavender, the most well-known one is *Lavandula angustifolia (known also as Lavandula officinalis*). The majority of species contain essential oils in 1-3%. The oil is a mixture of different ingredients, may contain linalool, linalyl-acetate, camphor, geraniol, cumarins and flavones. Patients with geraniol sensitivity show a weak or strong reactions to ylang ylang oil or to lavender oil, thus they usually contain geraniol in various proportions. Cross-reactions of lavender oil have also been reported with Balsam of Peru and wood tar, but in case of a common presence simultaneous sensitization may also occur [1-5].

Due to its therapeutic (relaxing, antidepressive, antimicrobial, antimycotic) effects, lavender oil has been used for centuries as an alternative drug for a long time. Its use in cosmetics and in foods is also very popular worldwide, Exposure can be airborne (aromatherapy, perfumes) by oral route (teas, honey, jam, sweets, spices) or direct skin and mucous membrane contact (soaps, body oils, creams and mouthwashes)[1-7].

The increasing number of applications resulted hypersensitivity-reactions in various localisations. Lavender oil can provoke contact dermatitis and photoallergic reactions. The strong, concentration-dependent irritative effect of the constituents may also raise the development of hypersensitivity[1,4,6-10].

The *Contact Dermatitis Work-Group* of the *Hungarian Dermatological Society* organised and conducted a multicentre survey to map the frequency of lavender hypersensitivity in Hungary.

Material and Methods

We performed the epicutaneous patch tests in our multicentre, prospective study between February 1st 2013 and February 1st 2014. Besides environmental routine test series we also used 2% lavender oil in pet. (All test material from *AllergEAZE Brial*). The occlusion time by testing was 48h, the allergens were applied on the back. We used *Curatest* (*Lohmann & Rauscher*) chambers. Evaluation of the test was performed at the 60th minute of the occlusion, then on D2, D3, D4 and D7. Reactions were taken as positive 1+ or more intense[11].

Number of the consecutive tested patients was 1509, 350 men and 1159 women. The mean age was 46.7 years (range: 9-92 years).

The number of tested patients were: in Budapest 711 (Dept. of Dermatology, Venerology and Dermatooncology of Semmelweis University /605/ + Dermatological Outpatient Dept. of the Unified Szt. István- Szt. László Hospital /74/ + National Work Hygiene and Occupational Healthcare Institute /32/), in Szeged: 299 (Dept. of Dermatology and Allergology of the Szent-Györgyi Albert Clinical Centre), in Kaposvár: 209 (Somogy Megyei Kaposi Mór Teaching Hospital Dpt. Dermatology) in Debrecen: 195 (Dpt. of Dermatology of the University of Debrecen, in Miskolc: 95 (Semmelweis Medical Centre of Miskolc, Centre of Dermatology).

The most frequent clinical diagnoses of the patients (done before the patch testing) were allergic contact dermatitis (n=469), irritative contact dermatitis (n=476), atopic dermatitis (n=108) and seborrhoeic dermatitis / rosacea (n=150) (**Table 1.**).

Results

We verified contact hypersensitivity to lavender oil in 8 patients (0.53%): we could not detect any immediate reaction, all the positivities were late-type reactions, most reactions were observed at or after D3 **(Table 1., Table 2.)**. In 7 cases the present relevant positivity was confirmed by a specific provoking factor, one patient could not identify actually the contact (patient 1.: unknown relevance). Clinical symptoms affected the face and the eyelids in 5 patients.

Table 1. Diagnostic distribution of the tested patients and positive reactions to lavender oil

Diagnosis	n	Hypersensitive reaction to lavender oil D2 or late	IR
Allergic contact dermatitis	469	7	4
Irritative contact dermatitis	476		3
Atopic dermatitis	108		1
Dyshydrosis	38		
Seborrhoeic dermatitis / Rosacea	150	1	
Microbial eczema	84		
Stasis dermatitis	38		
Psoriasis	54		
Others*	92		
Total	1509	8	8

*urticaria acuta/Quincke oedema 52; oral mucosa symptoms 18; drug related exanthema 11; prurigo nodularis 5; lichen ruber planus 3; acute generalised exanthematous pustulosis 1, alopecia areata 2. IR: irritative reactions

We found associated sensitization in four patients (formaldehyde, mercury chloride, nickel, propylene glycol, 2-mercaptobenzothiazole /MBT/, thiuram mix, mercury chloride - ammoniated). We did not find any Fragrance Mix, Fragrance mix II, Balsam Peru (Myroxylon pereirae), colophonium, wood tar mix, sesquiterpene lactone mix, or turpentine peroxides hypersensitivity among our patients with lavender oil sensitivity **(Table 2.)** .

The skin symptom-provoking contacts were cosmetics (soap, baths, shampoos, creams) air fresheners, volatile oil and the lavender plant itself. One of our patients, a 55 year old woman came to our clinic with hand dermatitis (after direct contact with lavender plant) (**Figure 1.**). Besides this results, we detected 8 irritiant reactions.

Discussion

Exposure to lavender oil can induce contact dermatitis or photoallergic reactions. The strong concentration-dependent cytotoxic effect of its constituents may cause irritation and also enhance sensitisation. This may typically occur during application of different mixtures of volatile oils, tinctures, massage oils, perfumes and aromatherapy. Linalool and linalyl acetate are week sensitisers but in case of getting into contact with air, autooxidation leads to formation of oxidation products and thus they become strong allergens[12,13]. Its photosensitizing reactions are thought to be associated with cytotoxicity and psoralen contamination of the essential oils[2]. In the course of distillation of lavender flower other allergenic components can also be identified: lavandulol, 1,8-cineol, lavandulyl acetate, camphor and geranium oil. Lavender oil is also often applied on the skin without dilution and it appears in the plasma due to the rapid absorption of its ingredients [3,14,15].

Lavender oil is usually patch tested at 2% in pet, but *De Groot* recommends different concentrations (1,2,5,8,10,16 % pet) – for various species of the

Table 2. Clinical symptoms of lavender hypersensitivity and the provoking contacts, associated contact sensitivities

Case number	Age (year)	Gender	Diagnosis	Localisations of skin symptoms	Intensity of reaction						type of relevance	Associated sensitivities
					D2	D3	D4	D7	skin contact	airborne contact		
1.	55	male	ACD	face, oral mucosa	-	++	++	++	?	?	unknown	-
2.	85	female	ACD	face, eyelids	-	-	-	++	soap	air freshener	present	-
3.	32	female	ACD	eyelids	-	-	++	++	soap		present	nickel, formaldehyde, mercury chloride - ammoniated
4.	41	male	rosacea	face	-	++	++	++		air freshener	present	propylene glycol
5.	55	female	ACD	hands, wrist	-	+	++	++	living plant	volatile oil	present	-
6.	70	male	ACD	hands, forearms	++	++	++	++	living plant		present	MBT, thiuram mix, mercury chloride - ammoniated, mercury chloride
7.	59	female	ACD	feet, sole	-	++	++	++	living plant		present	-
8.	61	female	ACD	face, forehead	-	++	++	++	cosmetics, dried plant		present	formaldehyde

ACD: allergic contact dermatitis

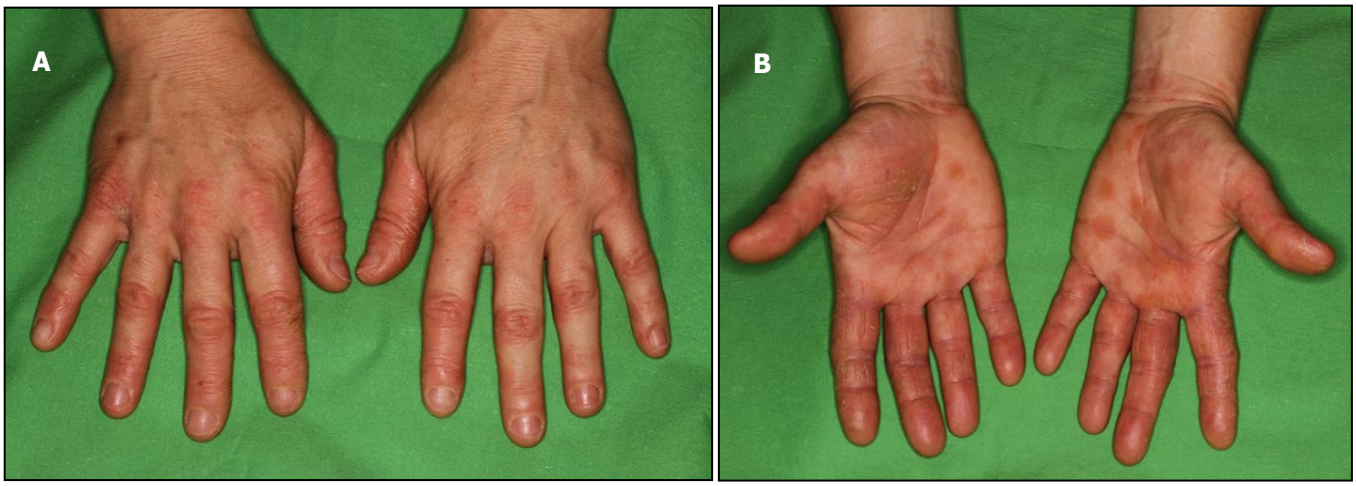

Figure 1. a-b Contact dermatitis on the hand provoked by nursing the lavender plant of a 55 year old female patient (patient no. 5).

plant[16,17]. Recent results of a French centre suggest to include lavender oil testing in the baseline series[18].

Searching the frequency of contact sensitization to lavender, *Calnan* [19] detected a prevalence of 0.52% in 1970. *Rudzki* proved lavender contact sensitization with 2% lavender oil in pet. in 2% of 200 patch tested patients[20]. *Larsen et al* verified a lavender sensitization rate of 2.8% by testing selected fragrance - sensitive patients[16].

In a Japanese study conducted between 1990 and 1997, *Sugiura et al* found an increasing frequency (1.1% - 13.9%) of contact allegy to lavender oil tested at 20% pet, in a selected population of patients with cosmetic contact dermatitis, with lesions localized mainly to the face, eyelid and hands. Dermatitis was related to exposure to air fresheners, perfumes, aroma candles and the plant itself [21]. In ours as in other studies, anatomical localisations of typical lavender contact allergy are hands, body, face[2,4,8,9,15,22,23], but exposure to the allergen frequently remains hidden[21].

Conclusion

According to the data of our multicentre study the prevalence of sensitization to lavender oil in Hungary is 0.53% at present (8/1509 patients). In the course of the tests we could not detect any immediate test-reaction, all the positivities were late-type test-reactions. In 7/8 cases the present relevant positivity was confirmed by a specific provoking factor, typical were cosmetics, air fresheners and the plant itself. According to our everyday practical experiences a lot of people use lavender oil in cosmetics, in foods or as natural drug in our country. The contacts become more and more frequently, so further increase of the sensitivity rate may be expected.

Ethics

The work has been approved by the ethical committees and all the subjects gave informed consent to the work.

Conflict of Interest: none

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