

Occupational contact dermatitis due to “bath bombs”

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Bath bombs are cosmetic products made of dry ingredients that effervesce when wet (Figure 1). They are used to add scent and color to bath water. Occupational allergic contact dermatitis due to bath bombs has never been reported. We report two patients with occupational contact dermatitis caused by fragrances in bath bombs.

CASE REPORTS

Case 1

A 23-year-old woman with a personal history of atopic dermatitis, allergic rhinitis, and conjunctivitis presented with hand eczema lasting 9 months. The patient had been working as a part-time shop assistant in a cosmetic shop for 2 years before the rash appeared. She was responsible for bath bomb demonstrations and usually washed her hands about 10 times per hour. The patient was patch tested with the Swedish and extended baseline series used in Malmö, a cosmetic series, and personal products including bath bombs at a concentration of 50% in water (aq.). The results showed weak positive reactions (+) to bath bomb, *Myroxylon pereirae* resin, hydroperoxides of linalool, hydroperoxides of limonene, methylisothiazolinone, benzisothiazolinone, decyl glucoside, 2-hydroxyethyl methacrylate, lanolin alcohol, and zinc pyrithione, and a strong positive reaction (++) to gold (I) sodium thiosulfate dihydrate (Table S1).

Case 2

A 28-year-old female patient with atopic dermatitis presented with hand eczema for 9 months. The patient had been working as a cosmetic shop assistant for 4 years. She demonstrated the bath bombs and washed her hands more than 20 times per day. She had been patch tested with the Swedish and extended baseline series used in Malmö, a fragrance series containing substances not included in the fragrance mixes in the baseline series, as well as plant series, cosmetic series, and personal products including bath bombs at concentrations

of 5%, 15%, 25%, and 50% aq. The patient had positive reactions (++) to *M. pereirae* resin, bath bomb 50% aq., and (+) to potassium dichromate (Table S1).

A workplace visit was performed to better clarify the actual exposure at work of patients. There were a few demonstration stations in the shop where both patients always presented the products in metal bowls full of water.

Both patients were diagnosed with occupational irritant and allergic contact dermatitis. To differentiate irritant reactions from allergic reactions to bath bombs, 27 consecutive individuals, 20 female and seven male, were tested with bath bombs 25% and 50% aq.; results in all controls were negative.

DISCUSSION

Bath bombs are scented spheres that are generally made from citric acid, sodium bicarbonate (NaHCO_3 ; called baking soda) and cornstarch.¹ Other ingredients such as fragrances, colors, and magnesium sulfate (MgSO_4 ; called Epsom salt) may be added to get more remarkable products.¹

In both the patients the results of patch tests showed positive reactions to *M. pereirae* resin (balsam of Peru) and to bath bomb 50% aq. (Table S1). Hydroperoxides of linalool and limonene also gave positive reactions in one patient (Table S1). The negative results of patch tests with bath bombs in controls excluded irritant patch test reactions to the product. Consequently, allergic contact dermatitis to bath bombs was diagnosed, likely caused by contact allergy to fragrances. However, the actual culprit allergens remains unknown. Crude *M. pereirae* is not used as fragrance ingredient but substances found in *M. pereirae* may be used as fragrance ingredients.² Contact allergy to *M. pereirae* has been reported frequently in patients with hand eczema.³ It is thought to be a good marker for fragrance allergy because it contains substances that may be used as fragrances.² Case 2 was tested with an additional fragrance series containing benzyl benzoate and benzyl cinnamate, two of the quantitatively most important substances in *M. pereirae*, but the patient was negative to these substances.



FIGURE 1 (A), Bath bomb tested in the two patients. (B), Demonstration of a bath bomb dissolved in water

Contact allergy due to fragrances is common in the population but the reactions are often not strong, and the exposure is very broad and often also includes the home environment of the patient; thus occupational dermatitis is often difficult to ascertain.⁴ Occupational allergic contact dermatitis due to fragrances and essential oils has been mostly reported in masseurs.^{5,6} Here the work place visit enabled an understanding of the wide exposure to fragrances at work and the manner in which the hands were exposed (Figure 1). Furthermore, shop assistants had not been considered as a high-risk occupation to have a long water contact time causing irritant hand eczema.⁷ The workplace visit proved that the work tasks certainly must be described as wet work. Hence, the diagnoses of concomitant occupational allergic and irritant hand eczema caused by fragrances in bath bombs and wet work, respectively, were made.

These are the first documented cases of occupational contact dermatitis caused by fragrances in bath bombs. Even if the diagnosis could be established, it proved difficult to help the patients with preventive measures. Although gloves could have helped patients to protect their skin from irritation and contact allergens, the use of gloves was not encouraged because it was thought inappropriate that the shop assistant, while showing the customer how the bath bomb worked, used gloves: Wearing gloves could make the consumers question the safety of bath bombs. It has been shown that occupational contact dermatitis is costly both for the individual and for society. Early diagnosis and assistance with preventive measures that can help the patient continue in work has been found effective not only economically but also with regard to the individual's quality of life.^{8,9} Change of profession was, however, an option in our hand eczema patients due to the young age of our patients, the many positive patch tests, and the fact that use of gloves was not encouraged at work.⁹

In conclusion, we report two cases of occupational contact dermatitis caused by fragrances in bath bombs that have never been reported. We

highlight the importance of patch testing and workplace visits in such patients to identify the causes and enable the best care for patients.¹⁰

CONFLICT OF INTERESTS

The authors declare no conflicts of interest

AUTHOR CONTRIBUTIONS

Annarita Antelmi: Conceptualization; investigation. **Thanisorn Sukakul:** Data curation; writing-review and editing. **Martin Mowitz:** Conceptualization, formal analysis, investigation. **Cecilia Svedman:** Supervision, writing-review and editing.

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company manufacturing heat exchangers. *Contact Dermatitis*. 2013; 68(3):175-180.

SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.

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Online supplemental Table 1. Positive patch reactions observed at day (D) 4 test reading in case 1 and 2.

Case 1		
Substances tested	Concentration (vehicle aq=water, p=petrolatum)	D4
<i>Myroxylon pereirae</i> (balsam of Peru)	25% p	+
Hydroperoxide of Linalool	1% p	+
Hydroperoxide of Limonene	0.3% p	+
Methylisothiazolinone	0.2% aq	+
Benzisothiazolinone	2% p	+
Benzisothiazolinone	1.5% p	+
Decyl glucoside	5% p	+
2-Hydroxyethyl methacrylate	2% p	+
Lanolin alcohol	100%	+
Zinc pyrithione	1% p	+
Gold (I) sodium thiosulfate dihydrate	2% p	++
Bath bomb	50% aq	+
Case 2		
Substances tested	Concentration (vehicle aq=water, p=petrolatum)	D4
<i>Myroxylon pereirae</i> (balsam of Peru)	25% p	++
Potassium dichromate	0.5% p	+
Bath bomb	50% aq	++
Bath bomb	25% aq	-
Bath bomb	15% aq	-
Bath bomb	5% aq	-