

Persulphates allergic contact dermatitis from spa: A new aetiology of nummular contact dermatitis

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CASE REPORTS

Case 1

A 59-year-old man, with a past history of seborrheic dermatitis, was referred for an extended fluctuating dermatitis with multiple erythematous and itchy coin-shaped lesions. There was no atopic comorbidity, he was only known for a seborrheic dermatitis and a single hand eczema episode.

The eruption began a couple of months after using a spa at home disinfected by an active oxygen treatment (Purissim'eau, oxygène actif spa, Hydrapro, Etrelles, France) and affected mainly the lower limbs and trunk (Figure 1B). The patient noticed improvement after 3 weeks of spa eviction.

Case 2

A 57-year-old man with past history of type 2 diabetes and hypertension presented with a nummular eczema that has been developing for 6 months. The eruption started on the abdomen and extended to the

upper and lower limbs improving under topical steroids. The histological examination was in favour of a prurigo-eczema.

The patient declared acquiring a hot tub a few months prior to the dermatitis treated with active oxygen (Hth Spa choc sans chlore, Innovative Water Care, Amboise, France).

In both cases, patch tests were performed after remission using IQ Ultra chambers (Chemotechnique Diagnostics) in occlusion for 2 days with Opertape (Iberhospitex Innovative Health Technologies). Tests were conducted with the European baseline series with a French additional series and ammonium persulphate 2.5% pet (Chemotechnique, Vellinge, Sweden) with reading at D2 and D3 according to ESCD recommendations.¹

A positive reaction was observed only for ammonium persulphate, ++ for the first patient and +++ for the second one on D2 and D3 (Figure 2).

Case 3

A 50-year-old non atopic patient was referred for an eczematous itchy nummular dermatitis, located on the trunk and limbs (Figure 1A).

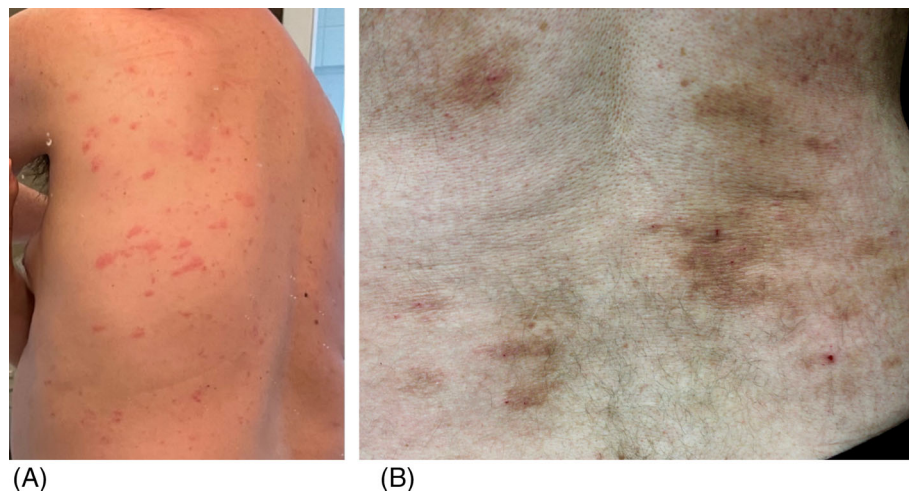
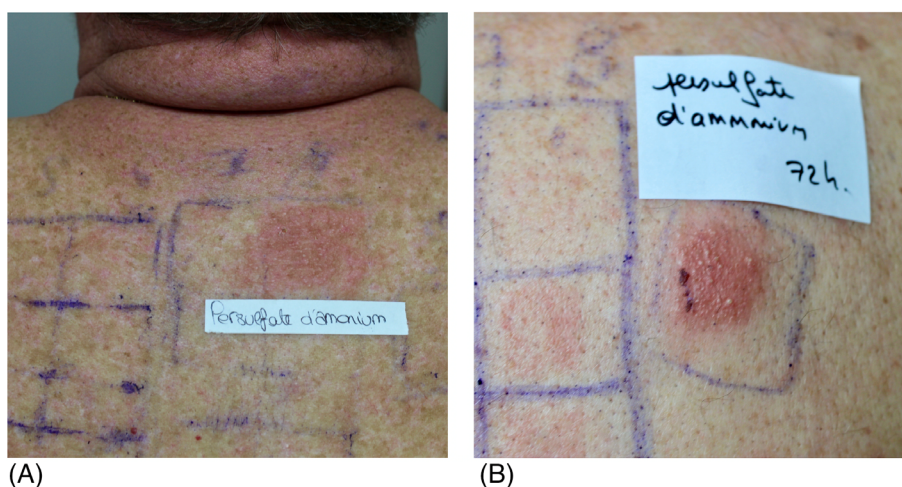


FIGURE 1 Nummular dermatitis. (A) Round or coin-shaped erythematous papules on the trunk ranging in size from 1 to 3 cm. (B) Erythematous coin-shaped lesions located on the trunk with scratch marks.

FIGURE 2 Positive patch tests reaction to ammonium persulphate (2.5% pet): ++ for the first patient (B) and +++ for the second patient (A) on D3.



The patient bought a spa treated with an active oxygen preparation (Oxy Choc, Canac, Québec, Canada) 2 months before the eruption.

The lesions appeared recurrently within 6 h after using the spa and resolved with topical corticosteroids. No recurrence occurred with spa eviction. Patch tests performed using Finn chambers (AllergEAZE® SmartPractice® Calgary, Canada) with the NACDG (North American Contact Dermatitis Group) baseline series (Chemotechnique, Vellinge, Sweden). Tests were only positive ++ for ammonium persulphate 2.5% pet on D4.

Potassium peroxymonosulphate (CAS number 70693-62-8) (all cases) and potassium persulphate (CAS number 7727-21-1) (case 3) were found in the composition of spa active oxygen treatments. We advised the patients to avoid all persulphates, as frequent cross reactivity is observed, and to switch to a hydrogen peroxide-based or chlorine shock treatment.

DISCUSSION

Persulphates including ammonium, sodium and potassium persulphates are inorganic salts used as oxidizing agents in different manufacturing processes, hair bleaching products, bleaching flour in some countries, photographs, cosmetics, textile or pharmaceutical industry.

They have been reported to cause both delayed-type reactions such as allergic or irritant contact dermatitis, and immediate type reactions with some rare cases anaphylaxis with severe systemic symptoms.²

In a retrospective study, patients sensitized to persulphates were more likely to be male, have a hand dermatitis or scattered generalized dermatitis. Most of them were relevant and occupationally related. Swimming pool/spa water and hair care products were the most common sources of persulphates.³ Pool and hot tub water treatment consists of a two-step process. Firstly, sanitation is the process by which pathogenic micro-organisms are killed, accomplished by a chlorine or bromine donor. Then, oxidation (or shocking) with chlorine, bromine or persulphates eliminates

organic contaminants such as perspiration, body oils and cosmetic products.⁴

The pathophysiology of nummular eczema, also called discoid eczema and microbial eczema remains unclear. It may occur as a feature of atopic dermatitis, asteatotic eczema or stasis dermatitis.⁵

Colonization with *Staphylococcus aureus* is a common hypothesis and could be explained by a hypersensitivity reaction to bacterial antigens causing skin damage.^{6,7} Factors that compromise the cutaneous lipid barrier such as xerosis can also be involved.⁵ Nummular eczema is very rarely related to allergic contact dermatitis but biocides/antiseptics are often incriminated.⁸

Concerning persulphates in spa water, a hypothesis could be that as disinfectants, they could potentially deregulate skin microbiome and lead to modification in *Staphylococcus aureus* expression on the skin.

It would be relevant to add the search for a spa or swimming pool in the questionnaire for recurrent dermatitis especially nummular, of unclear aetiology.

AUTHOR CONTRIBUTIONS

Marianne Tissinier-Vivent: Conceptualization; visualization; writing – original draft; writing – review and editing. **Marie-Claude Houle:** Methodology; project administration; writing – review and editing; writing – original draft; resources; supervision; investigation. **Aurélien Du-Thanh:** Writing – review and editing; resources; supervision; formal analysis. **Nadia Raison-Peyron:** Conceptualization; investigation; methodology; project administration; supervision; visualization; writing – original draft; writing – review and editing.

CONFLICT OF INTEREST STATEMENT

The authors have no conflicts of interest, financial or material support to report.

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Lichen planus pigmentosus: A rare case of contact sensitization to beard cosmetic oil

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KEYWORDS: beard cosmetics, case report, cosmetics, fragrances, LPP, patch test

Beard cosmetics are a fast-growing segment of the personal care industry. We herein present a case of Lichen planus pigmentosus (LPP), triggered by the use of beard cosmetic oil.

CASE REPORT

A 29-year-old man presented with a history of dark patches on the face after using a beard cosmetic oil, for alleged hair growth benefits. The ingredients of the beard oil were Sesamum Indicum (Sesame) Seed Oil, Caprylic/Capric Triglyceride, Cocos Nucifera (Coconut Oil), Persea Gratissima (Avocado) Oil, Argania Spinosa (Argan) Kernel Oil, Parfum (Fragrance), Limonene, Linalool, Eugenol and BHT. Within 2 months of usage of this oil, he developed itching and pigmentation at the sites of contact, starting with the chin. He stopped applying the oil as soon as the initial patch was noticed, however, the pigmentation continued to progress (Figure 1). On examination, well defined slate grey to black hyperpigmented macules were noted on the lower third of the face and over the neck. A biopsy from the most recent lesion showed focal vacuolar changes in the basal layer of the epidermis and lymphocytic infiltration of the interface. Numerous melanophages

were present in the papillary dermis which showed thickening with delicate fibroplasia and mucin (Figure 2). A diagnosis of active LPP was made based on the clinical and histopathological findings.

DISCUSSION

Beard cosmetics encompass a range of topical beard applications, with claims ranging from hair growth to repigmentation of hair or better hair characteristics. The global beard oil market is expected to touch the one billion USD mark in the coming years,¹ and for those with constitutional hypotrichosis, these beard cosmetics with alleged hair growth benefits are highly appealing as these agents claim to be herbal or natural.

There are a few reports on paraphenylenediamine induced beard dermatitis,^{2,3} but to our knowledge, this is the first case report of a beard hair growth oil causing LPP. While hair colouring of the beard has been associated with LPP or other lichenoid eruptions,^{4,5} hair growth oils have not been extensively studied yet. While studies have suggested the probable role of allergens/cosmetics in causing LPP on face,⁶ given the heterogenous nature of the products that are classed as beard oils, data on specific triggers is largely unavailable as yet.