

Allergic contact dermatitis caused by phenylethyl resorcinol [4-(1-phenylethyl)-1,3-benzenediol], a skin-lightening agent in cosmetics

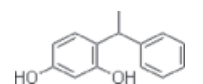
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A number of skin-lightening agents are currently available, including kojic acid, arbutin, and hydroquinone. However, all of these compounds have significant disadvantages. Kojic acid is believed to have a high sensitizing potential, leading to a relatively high incidence of contact sensitivity (1, 2). Arbutin (natural β -glycoside of hydroquinone) is suspected to be a hydroquinone precursor, and has been reported to cause allergic contact dermatitis (3). Hydroquinone is an aromatic compound that functions as an antioxidant, fragrance, reducing agent and polymerization inhibitor in cosmetics. However, to ensure safety, hydroquinone use is restricted to nail enamel (<0.02%) and hair dye (<1%) in the EU, and also to nail enamel (<1%) and hair dye (<1%) in the United



Molecular formula: C₁₄H₁₄O₂
Molecular weight: 214.264
CAS no.: 85-27-8

Fig. 1. Chemical formula of phenylethyl resorcinol [4-(1-phenylethyl)-1,3-benzenediol].

States (4–6). Phenylethyl resorcinol [4-(1-phenylethyl)-1,3-benzenediol] (Fig. 1)], a potent inhibitor of tyrosinase, is a relatively new and highly efficient skin-lightening agent (7, 8). We describe the first case of allergic contact dermatitis caused by phenylethyl resorcinol.

Case Report

A 52-year-old Japanese female presented with a 3-year-history of itchy erythematous rash and hyperpigmented areas on both cheeks. She had no history of contact dermatitis. Before visiting our hospital, she had been

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using several steroid ointments and antifungal creams prescribed by other dermatologists on both cheeks. These topical medicaments improved her symptoms, but the skin lesions relapsed. She reported that the facial erythema appeared after application of a skin-lightening essence for hyperpigmentation on the face.

We performed patch testing with her personal cosmetics and 17 cosmetic allergens, using Finn Chambers® (SmartPractice, Phoenix, AZ, USA) mounted on Scanpor® tape (Norgesplaster AS, Vennesla, Norway) on the upper back for 2 days. Reactions were read on D2, D3, and D7, in accordance with the International Contact Dermatitis Research Group recommendations. Positive reactions to the skin-lightening essence (+ on D2, D3, and D7) were observed. In the second patch test for cosmetic ingredients provided by the cosmetic supplier, the patient reacted to 1% and 0.1% phenylethyl resorcinol in pet. (+ on D2, D3, and D7). Other cosmetic ingredients and cosmetic allergens gave negative results. Patch tests with phenylethyl resorcinol in 1% pet. in 2 control subjects gave negative results.

Discussion

Cosmetics containing skin-lightening agents, such as kojic acid, arbutin, and hydroquinone, have been reported to cause allergic contact dermatitis (1–3). Other newer, skin-lightening agents, including 5,5'-dipropylbiphenyl-2,2'-diol, may also cause contact

dermatitis (9). Phenylethyl resorcinol has been used as a skin-lightening agent in cosmetics in Japan since 2000, and this is the first report describing an adverse skin reaction to this agent. Phenylethyl resorcinol, also known as SymWhite® 377 (Symrise AG, Holzminden, Germany), is a synthetic compound, and is one of the natural lightening compounds found in *Pinus sylvestris*. Phenylethyl resorcinol is used as a lightening and brightening agent in skin care products, hair-lightening products, and cosmetics. It reduces pigmentation and is used to lighten pigmented skin. Phenylethyl resorcinol was at least 10 times more effective than kojic acid in a pigmented three-dimensional epidermal model (MelanoDerma™) *in vitro*, and lightens human skin at a concentration of 0.5% in *in vivo* tests on Asian subjects (8). Gold et al. reported the usefulness of a hydroquinone-free skin-brightening cream containing phenylethyl resorcinol in patients with melasma (10).

The concentration of phenylethyl resorcinol in cosmetics ranges from 1% to 3%, and the cosmetics used by the present patient contained phenylethyl resorcinol at concentrations of 1% and 2%. We expect that phenylethyl resorcinol will be used in many products for its skin-lightening effect. To minimize the risk of sensitization, the concentration of phenylethyl resorcinol in skin care products needs to be regulated. In addition, information regarding the presence of phenylethyl resorcinol and its concentration should be clearly stated in the product information brochures of cosmetic products.

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