

A case of allergic contact dermatitis due to 3-glyceryl ascorbate in a skin-lightening lotion

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Accepted Article

Ascorbic acid (vitamin C) exerts multifunctional effects on skin integrity by inhibiting melanogenesis and increasing collagen synthesis.¹ However, it has poor stability in cosmetic formulations. The compound 3-glyceryl ascorbate (3-*O*-glyceryl ascorbic acid, CAS no. 1120360-11-3) is a novel derivative of ascorbic acid developed by introducing a glycerol group into the C-3 position of ascorbic acid. It has high stability in cosmetic formulations and easily penetrates the stratum corneum.¹ We report a case of allergic contact dermatitis due to 3-glyceryl ascorbate in a skin-lightening lotion.

Case Report

A 44-year-old non-atopic woman presented with a 2-month history of intermittent pruritic rash on her face. She had started applying a new skin-lightening lotion on her face 5 months earlier. The skin lesions had improved with topical corticosteroids and cessation of all cosmetics; however, the lesions recurred after resuming the use of the latter. The clinical presentation included facial erythema with prominent swelling of the eyelids (**Fig. 1a**). Because allergic contact dermatitis was suspected, we conducted patch tests with all her cosmetics applied “as is” using Patch tester Torii® (Torii Pharmaceutical Corporation, Tokyo, Japan). Readings, performed on day (D) 2, D3, and D7, in accordance with International Contact Dermatitis Research

Group (ICDRG) criteria, showed a strong positive reaction to the skin-lightening lotion 'as is' (D2++; D3++; D7++) (**Fig. 1b**). Subsequent patch testing with the ingredients of this lotion, at the concentrations used in the product, kindly provided by the manufacturer, displayed a strong positive reaction to 3-glyceryl ascorbate 10% aq. (D2++; D3++; D7+) (**Fig. 1c**), whereas the other ingredients, such as glycerol and trisodium ascorbyl palmitate phosphate, showed negative results. Three control subjects did not react to the same preparation of 3-glyceryl ascorbate. Discontinuation of the use of the skin-lightening lotion led to complete healing of the dermatitis without any further relapse.

Discussion

Ascorbic acid derivatives are present in various cosmetics, including skin-lightening lotions, sun screens, and facial cleansing foams. There are several case reports of allergic contact dermatitis due to such derivatives, such as ascorbyl tetraisoalmitate² and 3-*o*-ethyl-L-ascorbic acid.^{3,4} To our knowledge, this is the first case of allergic contact dermatitis caused by 3-glyceryl ascorbate. There is also a case report of allergic contact dermatitis caused by ascorbic acid in an anti-aging cream in a patient who displayed tolerance to oral ascorbic acid.⁵ Our patient has also regularly taken vitamin C, which is found in a variety of foodstuffs, but has never shown any reaction to it; cross-reactivity

between vitamin C and 3-glyceryl ascorbate is also considered very unlikely. Although ascorbic acid derivatives as used in cosmetics are considered relatively safe, they may occasionally provoke contact allergy.

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Figure Legend

Figure 1. Intense erythema accompanied by swelling of the eyelids. The patient gave consent for publication **(a)**. Positive patch test reactions to the cosmetic lotion (Day 3) **(b)** and to 3-glyceryl ascorbate (Day 2) **(c)**.

