

Allergic contact dermatitis to parthenolide

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Clinical Implications

- Parthenolide, a sesquiterpene lactone, occurs in the flowering plant family Compositae and is also used in a wide variety of herbal and alternative therapy products worldwide. Parthenolide-induced dermatitis should be considered in the differential diagnosis of contact dermatitis.

TO THE EDITOR:

Parthenolide is a sesquiterpene lactone that is found in the fruit and flowers of the plant feverfew (*Tanacetum parthenium* or *Chrysanthemum parthenium*).¹ Parthenolide, comprising 85% of the total sesquiterpene content, is located in the superficial leaf glands of the plant.² This plant is grown all over the world and is used for its anti-inflammatory effects to treat a wide range of conditions, including migraine headache and arthritis.² Parthenolide also occurs in other common flowering plants of the family Asteraceae (Compositae), including daisies and magnolias.¹ We present a case of contact dermatitis to parthenolide.

A 76-year-old woman with a history of allergic rhinitis presented with a chronic hand dermatitis for many years. She denied any associated environmental changes, such as changes in detergents, soaps, conditioners, shampoos, or cosmetics. There was no association with any particular foods or specific medications, such as nonsteroidal anti-inflammatory medications or antibiotics. The dermatitis was extremely pruritic and appeared to worsen when she performed gardening activities, especially during the fall, spring, and summer months. She did not perform much gardening in the winter season, and the dermatitis improved during this time. She had previously seen dermatology and was prescribed multiple topical preparations, including clobetasol propionate 0.05%, triamcinolone acetonide 0.1%, and pimecrolimus 1%, with only temporary benefit. On examination, there was erythema with thickening of the dorsal surface of the hands and fingers, as well as scaling erythema and lichenification of the palms. There were no vesicles noted. T.R.U.E. Test patch testing was performed. At 48 hours after application, there was a 1+ reaction (erythema and infiltration) to parthenolide. The patient cancelled the 96-hour patch test read but reported increased pruritis and irritation at the testing site in the days following the 48-hour read. At the 7-day patch test read, there was a 2+ reaction (increased erythema with infiltration and papules) to parthenolide (Figure 1). Based on the history (working extensively with flowering plants), timing (dermatitis worsening with exposure to these plants), and positive patch test result, a diagnosis of allergic contact dermatitis to parthenolide was made. Protective handwear was recommended for the patient with improvement in the dermatitis.

Allergic contact sensitization is a frequent cause of chronic hand dermatitis (24%).³ A “crescendo” (increase in reaction)

effect over the timing of the patch test reading, which occurred in our patient, is common in allergic contact dermatitis.⁴ Although *Alstroemeria* (Peruvian lily) is the most common cause of hand dermatitis in floral workers in the United States, parthenolide is the most common cause of plant dermatitis in India.^{3,5} In one study in Denmark, the prevalence of parthenolide-induced contact dermatitis was estimated to be 2.25% of all patients with contact dermatitis.⁶ Although direct contact is thought to be the main method of sensitization, parthenolide dermatitis has also been shown to occur via airborne particles, occurring not only on the palmar surfaces of the hands but also on the upper eyelids, posterior ear, submandibular region, décolletage of neck, forearms, and chest.^{7,8} Other Compositae allergens, including ragweed, sunflower, and goldenrod, can also cause airborne contact dermatitis.⁷ In addition, patients with a past or present history of atopic dermatitis may become sensitized to parthenolide at any age, regardless of occupational exposures.⁹

Because of the purported anti-inflammatory effects of parthenolide, multiple studies have provided insight into possible mechanisms. One study demonstrated that parthenolide inhibited I κ B kinase and nuclear factor kappa B activation in cystic fibrosis cell lines in mice.¹⁰ Another group studied the effect of parthenolide on human monocyte-derived dendritic cells stimulated with LPS or TNF- α .¹¹ Parthenolide inhibited the upregulation of costimulatory molecules (including CD 80, MHC class II, and CD 40) on dendritic cells induced by LPS but not by TNF- α , and parthenolide also prevented TNF- α and IL-12 secretion by LPS-stimulated dendritic cells.¹¹ Parthenolide prevented nuclear factor kappa B nuclear translocation and I κ B degradation in human dendritic cells induced by both LPS and TNF- α .¹¹ Because of these potential effects, parthenolide is being used in various herbal remedies, including herbal teas, tinctures, tablets, and supplements.¹ Topical products containing parthenolide have been shown to produce positive patch testing reactions in parthenolide-sensitive patients.¹²



FIGURE 1. Positive patch test (2+) to parthenolide observed 7 days after initial application of test.

In conclusion, we present a patient with parthenolide allergic contact dermatitis. Floral and garden exposures are obvious sources of sensitization. However, with the increasing use of herbal and alternative products worldwide, parthenolide-induced dermatitis should be considered in the differential diagnosis of any patient with a suspected contact dermatitis.

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