# Compositae (Asteraceae) dermatitis

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**ABSTRACT :**

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Compositae dermatitis is an allergic contact dermatitis caused by the Compositae (Asteraceae) plant family which is one of the largest plant families. The most important allergens in the Compositae family are sesquiterpene lactones (SQLs), which are found in the oleoresin fraction of leaf, stem, flower and pollen. Examples of some possibly relevant flower composites include; chrysanthemum, daisy, chamomile and sunflower. Classic Compositae dermatitis resembles an airborne pattern on exposed skin on face, V of neck, back of hands and forearms commonly seen in middle-aged and elderly people, more commonly in men. However the clinical features are diverse and a localized eczema on the hands or face is also a common presentation seen as occupational dermatitis in younger patients. When clinical features or contact history suggests a possible Compositae allergy patch testing should be done with the standard sesquiterpene lactone mix and also to the suspected Compositae plants or their extract.

**Key words:** Compositae, Asteraceae, dermatitis, sesquiterpene lactones, patch test

## บทคัดย่อ :

**เพ็ญพรรณ วัฒนไกร, อรพรรณ เตชฤทธิพิทักษ์ ผื่นผิวหนังอักเสบจาก COMPOSITAE (ASTERACEAE) วารสารโรคผิวหนัง 2549; 22: 109-118.**

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ผื่นผิวหนังอักเสบจาก Compositae เป็นผื่นแพ้สัมผัสที่เกิดจากพืชในตระกูล Compositae (Asteraceae) ซึ่งเป็นพืชตระกูลใหญ่ที่มีหลากหลายพันธุ์ สารก่อภูมิแพ้ที่สำคัญในตระกูล Compositae คือ sesquiterpene lactones (SQLs) ซึ่งจะพบได้ในยางของใบ ก้าน ดอก และเกสร ตัวอย่างของดอกไม้ในตระกูลนี้ที่อาจมีความสำคัญทางคลินิก เช่น ดอกเบญจมาศ เดซี่ และดอกทานตะวัน เป็นต้น ผื่นผิวหนังอักเสบจาก Compositae มีลักษณะจำเพาะคล้ายผื่นผิวหนังอักเสบ airborne นอกร่มผ้า บริเวณใบหน้า, บริเวณ V ของคอ, มือ และปลายแขน มักพบใน วัยกลางคนถึงสูงอายุ พบบ่อยในเพศชาย อย่างไรก็ดีลักษณะรอยโรคทางคลินิกมีได้หลากหลาย สามารถพบผื่นผิวหนังอักเสบเฉพาะที่บริเวณมือ หรือใบหน้า ได้บ่อย ซึ่ง เกิดจากการประกอบอาชีพในผู้ป่วยอายุน้อย เมื่อพบผู้ป่วยที่มีลักษณะทางคลินิก หรือมีประวัติการสัมผัสที่ชวนให้นึกถึงผื่นแพ้สัมผัสจาก Compositae ควรทำการทดสอบ patch test ด้วยสารทดสอบมาตรฐาน sesquiterpene lactone mix ร่วมกับส่วนของพืช/ดอกไม้ หรือ สารสกัดจากพืชหรือดอก ที่สงสัย


**คำสำคัญ :** ผื่นผิวหนังอักเสบ, Compositae, Asteraceae, sesquiterpene lactones, การทดสอบ patch test

**Introduction**

The plant family Asteraceae is still commonly known by its older name–Compositae. (Both names allowed by the International Code of Botanical Nomenclature –ICBN). It is also known as the sunflower, daisy or chrysanthemum family. Asteraceae is a large, diverse and interesting member of the plant kingdom representing about 10% of the world's flowering plants. There are about 20,000 species. It includes many troublesome weeds (e.g. dandelions), ornamentals (e.g. cosmos, marigold), herbaceous perennials (e.g. chrysanthemum) and vegetables (e.g. lettuce, artichokes) (Table 1). Asteraceae is one of the most common of plant allergens with at least 180 species of Asteraceae reported to cause contact dermatitis worldwide.[1]

There are about 500 varieties of chrysanthemums which are one of the most common causes of allergic contact dermatitis in florists and hobby gardeners. Other occupations with exposure to these plants such as farmers, foresters, outdoor workers and cooks are also at risk for becoming allergic. In addition, the increase

popularity of herbal use of Compositae for culinary, cosmetic and medicinal purposes must be considered. Many cosmetics contain plant extracts for fragrance. For example Chamomile is not only used for hair shampoo and conditioner but also an herbal tea to promote sleep. The best known Compositae, causing allergic contact dermatitis, apart from the chrysanthemums, are ragweed and feverfew (Parthenium species).

**Identification of Compositae (Asteraceae)**

The Compositae flowers have a unique arrangement. What we call the flower is really an inflorescence of many tiny flowers (florets) that are clustered to form a flower head (capitulum) at the stem apex. The flower head is then surrounded by bracts (modified leaves) that form an involucre (whorl of bracts beneath or around a flower cluster) (Fig.1). A single flower head produces a large numbers of seeds

**Table 1** Example of Compositae family[2]

| **Type** | **Name** |
|---|---|
| Ornamental annuals | sunflowers |
| | cosmos |
| | marigold |
| | asters |
| Herbaceous perennials | dahlia |
| | chrysanthemum |
| | marguerites |
| Vegetables | lettuce |
| | chicory |
| | artichokes |
| Herb | chamomile |
| | tarragon |
| Herbal medicines | feverfew |
| | pot marigold (Calendula) |
| Natural insecticide | pyrethrum |

| Type | Name |
|---|---|
| Weeds | bindii (Soliva pterosperma) |
| | ragweed |
| | capeweed |

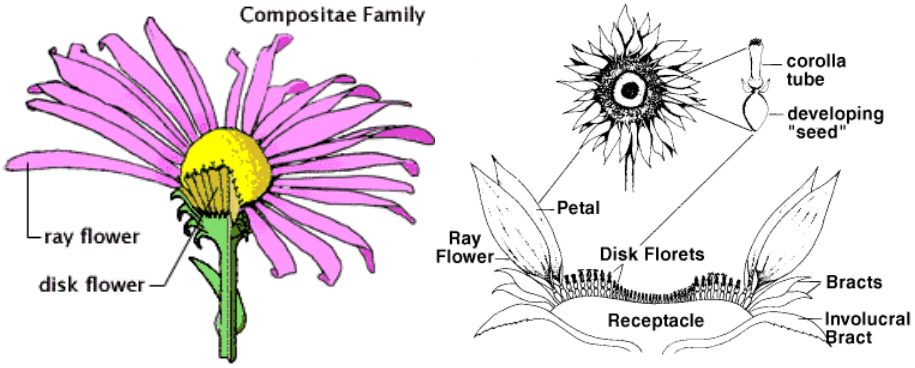



**Figure 1** Typical composite flower head (inflorescence) characteristic of the Compositae (Asteraceae) family.

**Table 2** Example of Compositae dermatitis synonyms

| Synonyms |
|---|
| • Australian bush dermatitis |
| • Chrysanthemum dermatitis |
| • Compositae dermatitis/airborne contact |
| • Parthenium dermatitis |
| • Ragweed dermatitis |
| • Sesquiterpene lactone dermatitis |
| • Weed dermatitis |
| • Pollen dermatitis |
| • Summer-exacerbated dermatitis |
| • Light-associated actinic reticuloid |

**Compositae dermatitis (Asteraceae dermatitis)**

Compositae (Asteraceae) dermatitis is an allergic contact dermatitis. Some synonyms for Compositae dermatitis are listed in table 2. It typically resembles airborne contact dermatitis and is frequently seen in middle-aged to elderly people, more commonly in men, with rare reports in children.[3,4] The exposed areas of face, 'V' of neck, dorsal hands and forearms are generally involved. Areas such as behind the ears "Wilkinson's triangle", the upper eyelids, nasolabial folds and under the chin are involved, allowing differentiation from a photo-related dermatitis. Initially, there is an acute dermatitis. After repeated exposure the flare becomes prolonged and produces a chronic lichenified eczematous dermatitis. Severe cases show dissemination to non-exposed areas and may become erythrodermic.[2]

However, there is an increasing recognition of diverse clinical patterns of Compositae dermatitis. Compositae sensitivity may present with a localized dermatitis as hand and/or facial eczema occurring in younger women or as generalized and photo- distributed dermatoses more common in older individuals.[4,5] However more recent reports show an equal sex distribution, unlike the classical Compositae dermatitis which was reported more frequently in men.[6]

Paulsen and Andersen described four patterns of Compositae dermatitis following review of patch testing with Compositae allergens and extracts (Table 3).[7]

**Table 3** Compositae dermatitis patterns as reported by Paulsen and Andersen.[7]

| **Pattern** |
|---|
| 1. Localized eczema : hands or face<br>occupational plant contact younger age |
| 2. Classic Compositae dermatitis of exposed skin<br>hobby gardeners elderly aged with no or few other contact allergies |
| 3. Localized eczema that developed to widespread dermatitis<br>some with vesicular hand eczema |
| 4. Vesicular hand eczema with more-or-less widespread dermatitis<br>and seasonal variation |

They found Group 3, 4 with vesicular hand eczema and more often widespread dermatitis to have frequent multiple contact allergies, especially to metals, and more atopy.

Paulsen et al reviewed 190 Compositae-sensitive patients, 42 were suspected of occupational dermatitis. Most of the occupationally sensitized were gardeners and greenhouse workers. Sensitization also occurred in, e.g., a zone therapist/flower arranger from arnica in a massage oil, in a former canteen staff member (lettuce) and in a home help and a domestic help taking care of pot plants as part of their work.[8]

**Compositae allergens**

**Sesquiterpene lactones**

The major sensitizing allergens in the Compositae family, sesquiterpene lactones (SQLs) are present in the oil-soluble plant oleoresin. SQLs are found in the leaves, stems, flowers, and possibly in the pollen.[9] SQLs are accumulated in glandular trichomes (hair-like structures) on the plant surface which are released on contact and readily become airborne when dry and pulverized.[2] SQL is a 15 carbon molecule composed of a sesquiterpene ($C_{15}H_{24}$) and a lactone ring (cyclic ester). (Fig 2) In general, the $\gamma$–methylene group bonded exocytically to the $\alpha$–lactone ring appears to be an immunochemical requisite of such dermatitis and increases allergenicity , although this is not always present in several antigenic SQLs.[10] Over 1350 SQLs have been extracted or synthesized with approximately half being potentially allergenic. The concentration of SQLs shows seasonal and geographic variation.

Cross reaction may occur among genera and among different Asteraceae and has been noted to depend, in part, on the *cis* or *trans* configuration of the methylene ring junction. The cross reactions however are variable and not complete among different species of Asteraceae. Thus making the diagnosis easy to overlook if the patient is not tested with the relevant plants or allergen individually contacted.

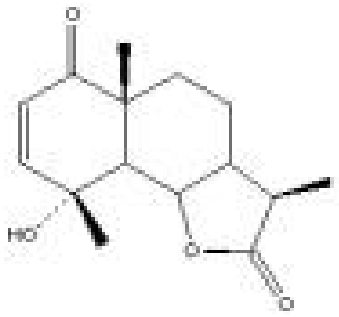



**Figure 2** Structure of sesquiterpene lactones

**Parthenolide**

Parthenolide is an important allergen in several Compositae species such as feverfew, tansy and is also present in some members of the Magnoliaceae.[11-13]

**Other Asteraceae allergens**

One survey emphasized that allergy to Compositae plants that do not contain SQLs has been observed, for example oxythymoldiesters produce a clinical picture easily mistaken for classic SQL dermatitis. Another group of compounds widely represented in the Compositae family are the polyacetylenes, which can produce phototoxicity and possibly also photoallergic reactions.[6]

**Florist's chrysanthemums (*Dendranthema X grandiglorum cv.*)**

Florist's chrysanthemums, commonly referred to as mums, are the most common Asteraceae plants that cause occupational dermatitis. Contact dermatitis occurs in amateur florists who pinch out the buds. The fingers or hands are often the initial site of involvement among florists and growers of Chrysanthemum.

**Sunflower (*Helianthus annus*)**

The sensitization to sunflower occurs in farmers,in the general population living in sunflower-growing areas as well as in tourists. Six new sesquiterpene lactones; annuolide H, helivypolides F, H-J, and helieudesmanolide A, together with known compounds,1,2-anhydroniveusin A and 1-methoxy-4,5-dihydroniveusin A are found secreted from sunflower trichomes and pollens.[14,15] Windblown trichomes from dry decorative plant can still cause airborne contact dermatitis.

**Dandelion (*Taraxacan offivinale*)**

The French term, dent de lion, described the immature seeds or leaves that resemble a lion's teeth. Airborne allergic contact dermatitis, aided by the parachute-shaped seeds, commonly occurs after mowing lawns. The SQL-Taraxinic acid (1'-O-beta-D-glucopyranoside) is the contact sensitizer in dandelions.[16] Result of patch testing with SQL mix is usually negative.

**Ragweed (*Ambrosia* spp.)**

Ragweed has high-molecular, water-soluble allergens, causing Type I allergic rhinitis and asthma. The plant also produces allergic contact dermatitis through Type IV reaction to one of the several lipid-soluble antigens, among which are the SQLs.

Occasionally, both types of immunological reaction occur in the same individual.

**Feverfew (*Parthenium hysterophorus*)**

Parthenium is a member of the Asteraceae family, which includes tansy, pyrethrum and feverfew. Feverfew, or carrot weed , is an American weed that was introduced accidentally to India by a shipment of American wheat.

*Parthenium hysterophorus* produced hundreds of cases of severe contact dermatitis in India. Feverfew dermatitis affects adult men more than adult women or children, although exposure is similar for all groups.[10] Parthenium dermatitis produces a severe ragweed-like dermatitis and may resemble photodermatitis. In some cases, the dermatitis progressed to a generalized erythroderma with fatal results. The weed has been called "scourge of India" and contains large amount of SQLs. The contact sensitizer parthenolide is an oil-soluble oleoresin present throughout the plant and pollen.[17,18] It is also present in tansy (Tanacetum vulgare), other Composites and Magnoliaceae species.

**Photosensitivity and Compositae dermatitis**

SQLs posses neither phototoxic nor photoallergic properties, however, some patients with chronic photosensitivity may react to Compositae.[9] Two series from St John's Institute for Dermatology found that 25% and 36% of chronic actinic dermatitis patients had allergic contact sensitivity to SQL mix, contrasting with Frain-Bell who found a stronger association in 86% of such patients, using unpurified plant extracts.[23] In contrast, Lim et al found no association in North American chronic actinic dermatitis patients.[24]

Lovell postulates that the photosensitivity demonstrated by some patients appears to be a non-specific consequence of Compositae allergic dermatitis. He found that, in contrast to patients with chronic actinic dermatitis, the majority of patients who are allergic to Compositae improve when they move away from the allergen, even when their sunlight exposure continues.[20]

In summary although photosensitization may play a role in a few Compositae-sensitive individuals, the association with UV-light sensitivity is still not clear. Despite many studies demonstrating the coexistence of photosensitivity with lowered UV-light thresholds and contact allergy to SQLs containing plants numerous hypotheses have failed to explain this coexistence.

**Diagnosis of Compositae dermatitis**

The diagnosis is made by patch testing with material containing SQLs. Because of the diversity of Compositae allergens cross-reactivity between SQLs in this large family does not follow any apparent rule. No single SQL will serve as a reliable screening allergen for patch testing. The suspected plants pieces, including leaves, pollen, florets and stems, should be used. However testing with plants may introduce the risks of severe, possibly bullous reactions (due to high allergen content), false positive reactions (due to irritant reactions), or false negative reactions (due to low allergen concentrations) and the risk of active sensitization.[6]

Extraction of SQLs, using purified diethyl ether from fresh plants has been described.[19] The extract is then dried, evaporated and diluted 1% in petrolatum for patch testing.

Sesquiterpene lactone mix 0.1% petrolatum (pet.) is commercially available and consists of equimolar quantities of three pure SQLs (alantolactone, dehydrocostus lactone and costunolide). Many centers have introduced this mix into their routine standard series. However, the SQL mix may fail to detect some Compositae, such as dandelion.[20] In 2 reports of patients with suspected Compositae allergy only 35% and 64% of cases were detected so it was concluded that SQL mix was not adequate as a screening test.[21,22] Therefore, in clinical practice, it is important that when clinical features suggest possible Compositae allergy both the SQL mix and the suspected plants or their extracts should be used for patch testing.

**Treatment of Compositae dermatitis**

Patients should be educated to avoid the plants of this family, and also other relevant cosmetics, toiletries, herbal creams and herbal remedies.Treatment with topical corticosteroid is of limited value if the patient still remains exposed. In case of widespread and severe dermatitis, potent topical corticosteroid is relatively ineffective. Systemic corticosteroids are effective, however, without proper avoidance, recurrence will occur. Azathioprine (2mg/kg/day) may help even protracted cases.[25-27] In one Indian preliminary open study in the treatment of parthenium dermatitis, azathioprine in weekly pulse doses has been found to be effective without any serious adverse effects.[28] Phototherapy with psoralen plus UVA (PUVA) has been developed and reported to improve Compositae dermatitis and photosensitivity.(9, 30) A few studies have reported successful oral hyposensitization.[9] However, risk of provoking and worsening dermatitis must be considered.

The mainstay of treatment for these patients includes careful patient education to maximize allergen avoidance combined with local, and possibly systemic, corticosteroid treatment.

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