



Indian J Dermatol. 2011 Nov-Dec; 56(6): 707–710.
doi: 10.4103/0019-5154.91833

PMCID: PMC3276901

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PLANT DERMATITIS: ASIAN PERSPECTIVE

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Received September 2011; Accepted September 2011.

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Abstract

Occupational and recreational plant exposure on the skin is fairly common. Plant products and extracts are commonly used and found extensively in the environment. Adverse reactions to plants and their products are also fairly common. However, making the diagnosis of contact dermatitis from plants and plant extracts is not always simple and straightforward. Phytodermatitis refers to inflammation of the skin caused by a plant. The clinical patterns may be allergic phytodermatitis, photophytodermatitis, irritant contact dermatitis, pharmacological injury, and mechanical injury. In this article, we will focus mainly on allergy contact dermatitis from plants or allergic phytodermatitis occurring in Asia.

Keywords: *Phytodermatitis, phytophotodermatitis, plant dermatitis*

Introduction

Clinical features

Once an individual is sensitized to a plant allergen, subsequent contact will elicit acute cutaneous lesions within 12-48 hours. The reaction is an acute eczema with severe pruritus, oedema, erythematous papules and urticarial-looking plaques that rapidly become studded with vesicles and tense bullae. Skin lesions appear where the plant has brushed against the skin, typically on the legs, thighs, hands and upper limbs. They classically display a linear morphology of crisscrossing streaks. The sticky sap can be transferred from the fingers to more distant sites, such as the face, trunk, and genitals. New lesions tend to continue to erupt for 1-2 weeks and may last for 4-8 weeks, or to flare up after stopping short courses of systemic corticosteroids. In subsequent episodes, the skin eruptions tend to become more severe, and they tend to appear after a shorter interval following exposure to the plant.

Plants that Cause Allergic Phytodermatitis in Asia

Allergic phytodermatitis

Several families in the plant kingdom are notorious causes of allergic phytodermatitis. Of particular importance are the Anacardiaceae (i.e., the cashew or sumac family) and Compositae (also known as the Asteraceae, including the aster, daisy or sunflower family). Different types of allergic phytodermatitis exist in different regions of the world.

The Anacardiaceae family

Plants such as the poison ivy, poison oak and poison sumac is a common cause of allergic phytodermatitis in North America. When damaged, all parts of the plant exude a sticky, strongly allergenic oleoresin, called urushiol. The allergens are pentadecylcatechols or heptadecylcatechols which possess benzene rings that bear hydroxyl groups at position 1 and 2, and aliphatic side chains at position 3. The length of the side chain and the number of its double bonds determine the allergenicity of the molecule.

In Asia, the Anacardeaceae family includes the mangoes fruit tree (*Mangifera indica*), lacquer tree (*Toxicodendron vernicifluum*) and hardwood (*Gluta renghas*) are the commonest causes of allergic phytodermatitis. The mango fruits contain urushiol in their exocarp (outer skin). Facial and perioral dermatitis occurs when a sensitized individual bites into an unpeeled mango. Approximately 80% of Japanese cabinetmakers exposed to the varnish extracted from the lacquer tree develop hand and forearm dermatitis. The cashew nut tree, *Anacardium occidentale*, bears reddish fruits that contain the kidney-shaped nut within a three-layered pericarp. The middle layer is filled with brownish oil rich in cardol and anacardic acid, chemically similar to urushiol. These catechols are destroyed when the nut is properly roasted and processed, but harvesters can develop allergic phytodermatitis from exposure to the oil.

Although unrelated to the Anacardiaceae, the *Ginkgo biloba* tree, which is found in temperate Asian countries, is also a source of urushiol-like catechols. The allergenic ginkgolic acid is present exclusively in the flesh of the drupe-like ovule.

The compositae family

Causes ragweed dermatitis in North America and chrysanthemum allergy worldwide. In India, airborne allergic contact dermatitis caused by *Parthenium hysterophorus*, from this family of plants is well known. The allergens are sesquiterpene lactones, 15-carbon molecules made of a sesquiterpene linked to a lactone ring. The allergenicity of sesquiterpene lactones is increased by the presence of an α -methylene group attached to the lactone ring.

Sesquiterpene lactones are present in fresh plants, pollen, and in particles from dried plants of the Compositae family. Classically, sesquiterpene lactone-induced dermatitis affects men more than women. Outdoor workers e.g., farmers and gardeners, have a higher risk for sensitization, but florists and nursery workers may be affected. Sensitization occurs through direct and airborne skin contact. Subacute eczematous lesions initially involve the face, neck, and the exposed areas of the upper limbs. On the face, massive lichenification may give rise to a leonine facies mimicking cutaneous lymphoma and actinic reticuloid.

Phytophotodermatitis

Phytophotodermatitis often mimics allergic phytodermatitis. Some families of plants contain psoralens or furocoumarins that trigger a phototoxic eruption when activated by exposure to ultraviolet-A light after contact with the skin. This reaction is not immunologically mediated, and it affects anyone under appropriate circumstances. The plant chemicals loosely bind to DNA but, when photoexcited, become covalently bound to pyrimidine bases on DNA strands, leading to cell death.

Phytophotodermatitis is most often caused by contact with plants of the *Apiaceae*, or *Umbelliferae* family. They include weeds and edible plants, such as carrot, parsnip, dill, fennel, celery and anise.

Lesions will appear within 8-24 hours of exposure to the sap of a psoralen-containing plant followed by sun exposure. Accompanied by a burning sensation, erythematous, irregular patches and streaks appear on areas that were exposed to both plant and light. Vesicles and large blisters may be present, but pruritus is not a major feature of the eruption, as opposed to allergic phytodermatitis. As the lesions heal, they are replaced by deeply pigmented macules that slowly fade in a few weeks to months. The juice of lime or other citrus fruits may flow around the mouth, spill over the hands from squeezing the fruits, or drip on the body followed by sun exposure during beach and poolside activities, producing bizarre blotches, spotty and trickle-shaped streaks of pigmentation. Contact with the cut ends of psoralen-containing celery has been reported to caused an epidemic of phytophotodermatitis affecting the forearms of grocery store workers.

Reports of Phytodermatitis in Asia

India

Plant contact dermatitis is one of the commonest causes of contact dermatitis in India. Of these, parthenium contact dermatitis is the most common cause of plant contact dermatitis. This is may be due to direct contact or airborne contact to the plant allergen. *Parthenium hysterophorus*[1–10] is a weed that grows profusely the whole year round, especially during the wet season. It is found in wasteland, along roads and railway tracks, water channels and in

fields. The allergen is a sesquiterpene lactone called, parthenin. Parthenin is present in all parts of the plant, especially in the trichomes under the leaves. Airborne contact dermatitis affects the chest. The hands, forearms, feet, legs, other exposed parts are usually affected and the dermatitis may become generalized when severe.

Xanthium strumarium, [10–13] is another weed in the Compositae family reported to cause allergic contact dermatitis in India. Patients with airborne contact dermatitis from *Parthenium hysterophorus* often have concomitant positive patch tests to this weed, although there have also been patients with allergy to this weed alone without concomitant allergy to parthenium.

Allergies to other plants have also been reported in India. They include the chrysanthemums [10,14–19] viz., *Helianthus annuus* (sunflower), [10] *Dahlia pinnata* (pinnate dahlia), [17] *Mikania scandens* [18] and *Holigarna ferruginea*. [19]

Laundrymen in India, called dhobis, mark their customers' clothes with an urushiol-containing black oleoresin extracted from the nut of *Semecarpus anacardium*. The ink is unaffected by boiling and has caused numerous cases of "dhobi itch," an allergic contact dermatitis at the site of contact, usually the nape of the neck. [20]

Florists making garlands with the white flowers of *Walidida antidysenterica* [21] has been reported to develop occupational allergic contact dermatitis from the flowers.

Indonesia

Similar to Malaysia, rengas (*Gluta rengas*) hardwood has been reported to cause allergic contact dermatitis in Indonesian woodworkers. Such contact dermatitis is seen in carpenters handling the rengas woods and foresters and hickers coming into contact with the resin exuded by the plant.

Japan

The Japanese lacquer tree (*Toxicodendron vernicifluum*) of the Anacardiaceae family has been reported to cause occupational allergic contact dermatitis in carpenters and furniture makers and polishers. Allergic contact dermatitis to the plant resin has also been reported in consumers [22] who come into contact with freshly varnished furniture where uncured resins remain. The causative allergen is urushiol.

Cases of occupational allergic contact dermatitis to tobacco leaves, [23] mitsuba (*Cryptotaemia japonica* Makino) vegetable leaves and its stalks [24] and okra (or lady's fingers, *Hibiscus esculentus*) leaves [25] have been reported in Japanese farm workers. Airborne contact dermatitis due to Japanese cedar pollen has recently been reported. [26]

Korea

Rhus dermatitis, especially from *Toxicodendron vernicifluum* (lacquer tree or varnish tree), is still a cause of allergic phytocontact dermatitis in Korea. Plants of the Rhus genus are related to poison ivy, poison oak and poison sumac. They belong to the Anacardiaceae family. Rhus sensitization is high in the general Korean population. In several Korean reports of patients with suspected contact dermatitis, the incidence of urushiol-positive patch tests was 18%, [27] while that of commercial Japanese Rhus allergen-positive patch tests was 13.9%. [28] Ingestion of chicken with Rhus may also cause systemic contact dermatitis. [29]

Erythema multiforme-like contact dermatitis from contact with a lacquer tree, also from the Anacardiaceae family, has also been reported. Other cases of plant dermatitis from Korea include allergic contact dermatitis from chrysanthemum; [30] irritant contact dermatitis from *Ranunculus* (buttercup) [31,32] and *Pulsatilla koreana* (Korean pasque flower); [33] contact urticaria from *Castanea crenata* (Japanese chestnut), [34] apple, plum and peach; and photocontact dermatitis from *Ficus carica* (common fig) [35] and *Angelica gigas* [36] have also been reported.

Malaysia

There have been reports of allergic contact dermatitis to a member of the Anacardiaceae family, *Gluta rengas* (rengas), a hardwood which resulted in dermatitis in woodworkers. Photocontact dermatitis from lime used in traditional medicine has been seen in several patients and may present in bizarre patterns. The cause of the photocontact dermatitis was reported to be psoralen in the lime juice.

Philippines

Anacardiaceae such as the cashew nut tree (*Anacardium occidentale*) has been reported cause allergic contact dermatitis in the Philippines.[37] The fumes from roasting cashews may also cause skin irritation. Another member of the Anacardiaceae, the mango fruit (*Mangifera caesia*), may also cause allergic contact dermatitis on the lips, face and/or neck. Contact with the fruit or sap of red pepper (*Capsicum annum*) has been reported to cause erythematous or bullous dermatitis.

Irritation reactions from several plants have been reported in the Philippines. These include *Dieffenbachia* (an ornamental house plant), *Hierba mala* (which has a caustic sap), *Fleurya interrupta* (lipang-aso, a herbal plant), *Calotropis gigantea* (crown flower). Some plants irritate chemically via calcium oxalate crystals, silicates, glycosides or alkaloids, while others irritate mechanically via hairs (trichomes) or spines (glochids).

Singapore

Allergic phytodermatitis has been reported from mango fruits as described above. Allergic contact dermatitis from rengas (similar to those seen in Indonesia and Malaysia) have been reported among carpenters and woodworkers handling the rengas group of wood. Some cases were reported to cause erythema multiforme-like eruption.

Sri Lanka

Contact urticaria from cinnamon (*Cinnamomum zeylanicum*) has been observed[38] in Sri Lanka. Plants belonging to the Anacardiaceae family such as mango (*Mangifera indica*) and cashew nut (*Anacardium occidentale*) are common causes allergic phytodermatitis in Sri Lanka. Another genus from the same family, *Semecarpus*, causes streaky laundry mark dermatitis, as the nut is used to mark laundry. This is similar to marking nut dermatitis in India, where it is known as dhobi-mark dermatitis.

Sri Lanka also sees its share of Compositae allergic contact dermatitis. The plants incriminated include the *Tithonia diversifolia* (a shrub found on roadsides and in wasteland). Their presentation is similar to that of the parthenium dermatitis in India, where airborne-contact dermatitis may be a presenting feature.

Taiwan

Nettles of the genus *Urtica* and Asian poison ivy have been reported to cause allergic contact dermatitis in Taiwan. Betel sellers were reported to develop finger dermatitis, most of which are irritant contact dermatitis although allergic contact dermatitis to the betel has been reported. Mango contact dermatitis is common during the mango season in Taiwan.[39]

Thailand

Like the Japanese lacquer tree, the Thai lacquer tree (*Melanorrhoea usitata*) which belongs to the Anacardiaceae family is a common cause of allergic phytodermatitis.[40] The allergen in this case is thitsiol.

Footnotes

Source of support: Nil

Conflict of Interest: Nil.

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