Case report

Rhinoconjunctivitis and asthma caused by corn plant (*Dracaena fragrans*)

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Background: Respiratory symptoms caused by decorative flowers have seldom been reported in the literature.

Objective: To describe a housewife who experienced episodes of asthma, rhinoconjunctivitis, and contact urticaria in relation to corn plant (*Dracaena fragrans*) in her home.

Methods: Skin prick testing (SPT) was performed with extract from the leaves of *D fragrans* and a standard battery of aeroallergens. An air sampler was installed close to the plant in her house. We performed skin, conjunctival, and bronchial provocation tests with the extract of *D fragrans*. Serum specific IgE was measured using enzyme allergosorbent testing.

Results: The patient showed positive SPT reactions to the *D fragrans* extract at a concentration of 0.05 mg/mL. Results of SPT with the extract prepared from the Air Sentinel filter were also positive. Skin provocation testing with the leaves of corn plant on the patient's forearm provoked dense wheal formation. The conjunctival provocation test response was positive to an antigen concentration of 0.05 mg/mL. The peak expiratory flow rate varied by 20% to 40% on exposure days and by 5% to 10% on nonexposure days. The bronchial provocation test response was positive to an antigen concentration of 0.5 mg/mL. Specific IgE to *D fragrans* extract was 15.1 kUA/L.

Conclusions: These findings strongly suggest that an IgE-mediated immunologic mechanism is responsible for the patient's respiratory and cutaneous symptoms in relation to corn plant.

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INTRODUCTION

Substances derived from plants are common causes of occupational respiratory allergy. These substances include different types of wood, cereal flour, coffee beans, latex, plant food, and enzymes.[1,2]

The Liliaceae family is extensive, including approximately 4,000 species in 280 genera, and is formed principally of grasses with bulbs (*Allium sativum*), lianas (*Smilax aspera*), and trees (*Dracaena draco*). They may be found all over the planet except in the arctic.[3] Some species of the Liliaceae family, such as the tulip, hyacinth, and white and colored lilies, have long been popular decorative plants and are causes of skin and respiratory allergy.[4,5]

Other genera of Liliaceae include decorative species such as corn plant (*Dracaena fragrans*). This includes approximately 40 tropical species from Africa and Asia that, in general, have the appearance of a palm. They are characterized by a straight, woody trunk from which dark green leaves sprout. In suitable humidity and temperature conditions, they can produce highly aromatic flowers, from which the name *fragrans* is derived.

The aim of this study is to describe a patient with asthma, rhinoconjunctivitis, and contact urticaria caused by corn plant (*D fragrans*) documented on the basis of the clinical history, skin prick test (SPT) results, specific IgE levels, specific bronchial and conjunctival challenge test results, and daily peak flow measurements during the symptomatic period.

CASE REPORT AND METHODS

A 54-year-old woman with no personal or family history of atopy who, for 2 years, had ocular and nasal pruritus, conjunctival hyperemia, sneezing, hydrorrhea, coughing, tightness of the chest, and wheezy dyspnea. The episodes were initially sporadic but in the previous 6 months had increased in frequency and intensity, with exacerbations occurring 4 to 6 hours after cleaning a *D fragrans* plant in her house (on 3 occasions she required emergency medical treatment for asthma crises). Furthermore, contact with the plant gave rise to itchy wheals, predominantly on the hands and forearms, which resolved spontaneously within 20 to 30 minutes.

Preparation of Corn Plant Extract

Leaves from corn plant (*D fragans*) were ground into small pieces, defatted, and extracted by means of magnetic stirring in agitation in 50-mmol/L phosphate-buffered saline at pH

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7.5 during 4 hours at room temperature. The sample was centrifuged at 5,600*g* for 30 minutes, and the supernatant was dialyzed against water. The dialyzed extract was filtered through a membrane with 0.22-μm-diameter pores and freeze-dried.

Skin Tests

The SPTs were performed according to the method described by the Subcommittee on Skin Tests of the European Academy of Allergology and Clinical Immunology using standardized lancets (Dome Hollister Stier, West Haven, CT)[6]; 1 sterile device was used for each test. Histamine phosphate (10 mg/mL) and sterile 0.9% saline were used as positive and negative controls, respectively. A mean wheal area of 7 mm^2 or greater compared with the negative control, 15 minutes after puncture, was considered a positive response.

Initially, SPT was performed with a standard battery of aeroallergens, including mites (*Dermatophagoides pteronyssinus* and *Dermatophagoides farinae*), fungi (*Alternaria alternata, Cladosporium herbarium,* and *Aspergillus fumigatus),* cat and dog dander, and pollens from Gramineae (*Lolium perenne, Dactylis glomerata,* and *Cynodon dactylon),* Oleaceae (*Olea europaea),* Chenopodiaceae (*Chenopodium album* and *Salsola kali),* Plantaginaceae (*Plantago lanceolata),* and Compositae (*Artemisia vulgaris*). This was followed by SPT with the extract of *D fragrans* leaves at serial concentrations, starting at 5 mg/mL (wt/vol). Skin provocation tests were performed with *D fragrans* by rubbing the leaves of the plant on the patient's forearm for 10 minutes.

A high-volume air sampler (Air-Sentinel; Quan-Tec-Air Inc, Rochester, MN) was installed close to the *D fragrans* plant in the patient's home. Using Teflon filters, a sample was collected after 8 hours of exposure. An extract was prepared for SPT using the material obtained.

Conjunctival and Bronchial Provocation Tests

The conjunctival provocation test was performed with *D fragrans* extract according to the method described by Möller et al.[7] Serial dilutions were prepared at 0.005, 0.05, 0.5, and 5.0 mg/mL of *D fragrans* extract. A nonspecific BPT with methacholine was performed using the procedure and concentrations proposed by Chatham et al.[8] To evaluate the relationship of the plant with the patient's asthma, peak flow was measured daily in the home for 4 weeks, recording the days of exposure. A specific BPT was performed with *D fragrans* extract according to the method described by Chai et al.[9] The patient underwent skin testing at concentrations of 0.005, 0.05, 0.5, and 5.0 mg/mL of *D fragrans* extract to determine a safe starting dose for the provocation test; this extract concentration was of 0.005 mg/mL (10-fold lower than the concentration that produced a 3 $\times$ 3-mm wheal). The patient inhaled the aerosolized allergen in progressively increasing concentrations (0.005, 0.05, 0.5, and 5.0 mg/mL) for 2 minutes at tidal volume. The forced expiratory volume in 1 second (FEV_1) and peak expiratory flow rate (PEFR) were measured after each inhalation period and also at 5, 10, 15, 30, and 60 minutes. To evaluate the bronchial late response, the patient herself monitored PEFR values in parallel with spirometry recordings taken using a portable peak flow meter (Mini-Wright; Clement Clarke International, Harlow, England) for up to 24 hours. The SPTs, conjunctival provocation tests, and BPTs were also performed on a group of control subjects (3 nonatopic individuals and 3 allergic to pollen).

Specific IgE Determination

Serum specific IgE to *D fragrans* extract was measured using an enzyme allergosorbent test (EAST) with the allergen coupled to cyanogen bromide–activated paper discs (0.4 mg per disc). Measurement of specific IgE to other common local aeroallergens (pollen from *L perenne, O europaea, S kali, A vulgaris,* and *Brassia verrucosa*) was performed using the CAP System (UniCAP; Pharmacia & Upjohn Diagnostics AB, Uppsala, Sweden). The cross-reactivity studies were performed by means of EAST inhibition assays, as previously described. The *D fragrans* extract was used as solid phase (inhibited) and the same extract and pollen extracts from *O europaea, L perenne,* and *B verrucosa* as free (inhibitor) phases.

RESULTS

This patient showed positive SPT reactions to the *D fragrans* leaf extract at a concentration of 0.05 mg/mL. The SPT responses to a battery of commercially available common inhalants were positive to pollen from *O europaea*, *A vulgaris,* and *S kali*. The SPT reaction with the extract prepared from the Air Sentinel filter was also positive. Skin provocation testing with the leaves of *D fragrans* on the patient's forearm provoked dense wheal formation at 20 minutes. The conjunctival provocation test response was positive to an antigen concentration of 0.05 mg/mL.

Peak flow monitoring on days with and without exposure indicated occupational asthma; the PEFR varied by 20% to 40% on exposure days and by 5% to 10% on nonexposure days, although the patient used regular budesonide, 800-μg inhalations, and salbutamol, 200 μg/d. The BPT response was positive to an antigen concentration of 0.5 mg/mL, observing declines in the FEV_1 to 32% and in the PEFR to 44% (Fig 1). No delayed reaction was detected using the peak flow meter during the 24 hours after BPT. The nonspecific BPT response to methacholine was also positive (provocation dose that caused a decrease in FEV_1 of 20% = 150 AU) 24 hours after specific BPT. None of the control subjects had a positive response to SPTs, conjunctival provocation tests, or BPTs.

Serum specific IgE to *D fragrans* extract was positive (15.1 kUA/L, class 3) with patient serum and negative (<0.35 kUA/L) with control serum (a pool of sera from nonatopic individuals). Specific IgE to common aeroallergens was negative to *L perenne, O europaea, S kali, A vulgaris,* and *B verrucosa*. The EAST inhibition assay, performed with *D fragrans* as solid phase, showed 90% inhibi-