

Case report

Occupational rhinoconjunctivitis and bronchial asthma due to *Phoenix canariensis* pollen allergy

Blanco C, Carrillo T, Quiralte J, Pascual C, Martín Esteban M, Castillo R. Occupational rhinoconjunctivitis and bronchial asthma due to *Phoenix canariensis* pollen allergy. Allergy 1995; 50: 277–280. © Munksgaard 1995.

We report a case of occupational bronchial asthma and rhinoconjunctivitis caused by *Phoenix canariensis* (PC) pollen. The canary palm is a type of palm tree, belonging to the Arecaceae family, which is widely distributed in frost-free regions as an ornamental tree. Our patient was referred because he suffered symptoms of bronchial asthma, rhinoconjunctivitis, and contact urticaria when pruning dried leaves from PC during the pollination months. The skin prick test (SPT) with a PC pollen extract was positive, as was the specific IgE to PC pollen determined by Phadezym RAST, indicating an IgE-mediated sensitization. The nonspecific bronchial provocation test (BPT) performed with methacholine disclosed a mild bronchial hyperreactivity, and specific BPT with PC pollen elicited an immediate fall of 25% in FEV₁ with respect to baseline. On RAST inhibition studies, a significant cross-reactivity was found between PC pollen and date palm (*P. dactylifera*) pollen. These results suggest that PC pollen could be a potential allergen in PC-growing areas.

C. Blanco¹, T. Carrillo¹, J. Quiralte¹,
C. Pascual², M. Martín Esteban²,
R. Castillo¹

¹ Department of Allergy, Hospital Universitario Ntra. Sra. del Pino, Facultad de Ciencias Médicas y de la Salud, Las Palmas de Gran Canaria, Canary Islands, Spain; ² Allergology Service, Hospital La Paz, Madrid, Spain

Key words: occupational asthma; palm tree; *Phoenix canariensis*; pollen allergy.

Dr C. Blanco Guerra
Sección de Alergia
Hospital Ntra. Sra. del Pino
C/ Angel Guimerá N° 93
35005 – Las Palmas de G. C.
Spain

Accepted for publication 30 August 1994

Phoenix canariensis (PC), or “canary palm”, is a type of palm tree native to the Canary Islands, which is widely grown as an ornamental tree (9). It belongs to the Arecaceae family, together with *P. dactylifera* (PD), another type of palm tree that is denominated “date palm” because of its edible fruit (dates). There are some differences between PC and PD, the main ones being that the fruit of PC is round, smaller, and inedible.

Recently, some cases of PD pollen allergy have been reported (4, 8), and its major antigens characterized by immunoblotting techniques (4, 6–8). To our knowledge, no case of PC pollen allergy has been described. In the present paper, we report one patient with occupational sensitization to PC pollen.

Case report

A 45-year-old man, a nonsmoker, with no personal history of atopic disorders, was studied in our outpatient service. He had been working as a gardener

for 26 years, and for the last 2 years he had suffered dyspnea, wheezing, nasal itching, sneezing, rhinorrhea, watery eyes, and contact urticaria, when pruning dried leaves from PC during the PC pollination months (mainly February–May). Symptoms persisted for 1–2 weeks after exposure, and for this reason he had required emergency room treatment twice during the last year. He usually improved during weekends, and became asymptomatic while he stopped working for 2 weeks. Symptoms returned on the day he restarted work in spring. He also remained asymptomatic outside the PC pollination months. Physical examination was normal (in summer) except for a mild conjunctival injection. The white blood cell count was 5.140/mm³ with 500 eosinophils/mm³. Chest and sinus radiographs were within normal limits. Basal spirometry disclosed FEV₁ of 98% and FVC of 86% predicted. Suspecting occupational rhinoconjunctivitis, bronchial asthma, and urticaria, we initiated an etiologic study with our patient's informed consent.

Material and methods

Pollen extract

PC pollen was collected from five male canary palm trees during the pollination months of 1993. The pollen was sieved to remove large debris and examined microscopically to exclude contamination by other pollens or by fungi.

For the preparation of crude extract, proteins were extracted by incubation of pollen in 0.05 mol/l ammonium carbonate and 0.01 mol/l thiourea at 2.5% (wt/vol) for 3 h, at 4°C, followed by 30-min, 4°C, centrifugation at 30 000 g. The supernatant was filtered through Whatman 1 filter paper, sterilized by passage through a 0.2-µm filter (Millipore, USA), frozen, and stored at -20°C until use. Protein content, assessed by the Bradford method (Bio-Rad, USA), was 0.5 mg/ml.

Skin prick tests (SPT)

SPTs were carried out with PC pollen extract (1:10 wt/vol), and with a battery of commercial aeroallergens (mites, fungi, pollens, and animal dander) (Abelló Laboratories, Madrid, Spain) in the volar side of the forearm. Histamine phosphate (10 mg/ml) was used as positive control and physiologic saline as negative control. The results were the measurements (mm) of the larger wheal diameters within 15 min of puncture. A wheal ≥ 3 mm in the presence of a negative response to the saline control was considered to be positive. Five healthy volunteers and five atopic patients were used as the control group for *in vivo* tests.

Total serum IgE

This was determined by the DELFIA method (Pharmacia Diagnostics, Sweden), following the manufacturer's instructions.

Specific IgE

PC pollen extract was fixed to cyanogen bromide-activated paper disks, according to the protocol of Ceska et al. (1). Serum-specific IgE was measured by the Phadezym RAST method (Pharmacia, Sweden). Results were expressed as RAST classes (from class 0 to class 4), according to Pharmacia instructions. Sera from two allergic patients with high levels of total IgE (859 and 1498 kU/l IgE) were used as negative control.

RAST inhibition

The protocol of Gleich et al. (5) was followed, with some modifications. Briefly, 100-µl aliquots of the

patient serum were incubated for 1 h at room temperature with 100 µl of 10-fold PD pollen extract (kindly supplied by J. Fernández, Elche, Spain) dilutions in PBS (100 µg/ml to 100 ng/ml). Supernatants were centrifuged, and RAST, with ¹²⁵I-labeled rabbit specific anti-IgE (Pharmacia, Sweden), was performed in duplicate on cyanogen bromide-fixed PC disks. The percentage of cpm counting inhibition was calculated in relation to the cpm fixed with an aliquot without PC incubation. RAST inhibition assay by incubating serum with PC pollen extract dilutions and using PD-coated disks was also carried out.

Bronchial provocation test (BPT)

A nonspecific BPT with methacholine was performed by the method described by Cockcroft et al. (3). The aerosolized particles were generated by a continuous pressurized DeVilbiss 646 nebulizer (Somerset, PA, USA), at an airflow rate of 6 l/m, and with an output of 0.26 ml/m.

A specific BPT was done with PC pollen extract, following the procedure proposed by Chai et al., with modifications (2, 10). First, SPTs were performed with 10-fold dilutions of PC pollen extract (prepared immediately before challenge from frozen extract), to determine a safe starting dose for the bronchial provocation, which was 1:1 000 000 wt/vol. Then aerosolized particles generated by a continuous pressurized DeVilbiss 646 nebulizer were inhaled for 2 min in normal breathing volume, starting with a control PBS solution, and followed (at 10-min intervals) by PC pollen extract in progressive concentrations. At baseline and every 5 min, pulmonary spirometric recordings were performed, defining a positive response as a greater than 20% fall from basal FEV₁. If there was a decrease in FEV₁ of between 15% and 20%, spirometric recordings were obtained for 20 min, before inhalation of the next dilution. After the BPT, hourly peak expiratory flow rate (PEFR) measurements were recorded for 12 h. A response was considered to be positive if there was a greater than 25% fall in PEFR from baseline. Two atopic patients with mild bronchial hyperresponsiveness (as defined by a nonspecific BPT with methacholine showing PC₂₀-FEV₁ between 2 and 4 mg/ml) were also challenged with 1:10 wt/vol PC pollen extract, after they had given written informed consent.

Results

The pollen grains collected from canary palm trees appeared to be homogeneous and typically monocolpate on microscopic examination. Our patient SPT with PC pollen extract showed an 8 × 7 mm

wheal with surrounding erythema. Meanwhile, SPTs with common aeroallergens were all negative, with a histamine control of 5×5 mm and no response to the saline control. The SPTs with PC pollen yielded negative results in all control subjects.

In our patient, total IgE was 84 kU/l, within normal limits. Specific IgE to PC pollen extract was positive (> 17.5 PRU, equivalent to RAST class 4) in patient serum. Specific IgE to PC pollen was not detectable in either control serum (class 0). During the nonspecific BPT, a 28% fall in FEV_1 was achieved with a 2.5 mg/ml methacholine concentration (PC_{20} - $FEV_1 = 2.1$ mg/ml), revealing a mild bronchial hyperresponsiveness. On specific BPT with PC pollen extract, 20 min after 1:100 wt/vol solution inhalation, the patient showed cough and wheezing, with a spirometric fall in FEV_1 of 25% with respect to baseline (Fig. 1). Symptoms were relieved 30 min after salbutamol inhalation, and there was also a spirometric improvement to normal values. PEFR monitoring disclosed an asymptomatic 20% fall from baseline, 6 h after the specific BPT, that persisted for 3 h. No response to PC pollen-specific BPT was observed in the two controls tested.

By incubating PC pollen-coated disks with increasing concentrations of PD pollen, a progressive RAST inhibition was obtained, reaching 93% at the maximum concentration (Fig. 2). With PD pollen-coated disks, a similar significant RAST inhibition was achieved by incubating with PC pollen extract, reaching 95% inhibition.

The patient was advised to avoid exposure to palm trees during the PC pollination months and treated

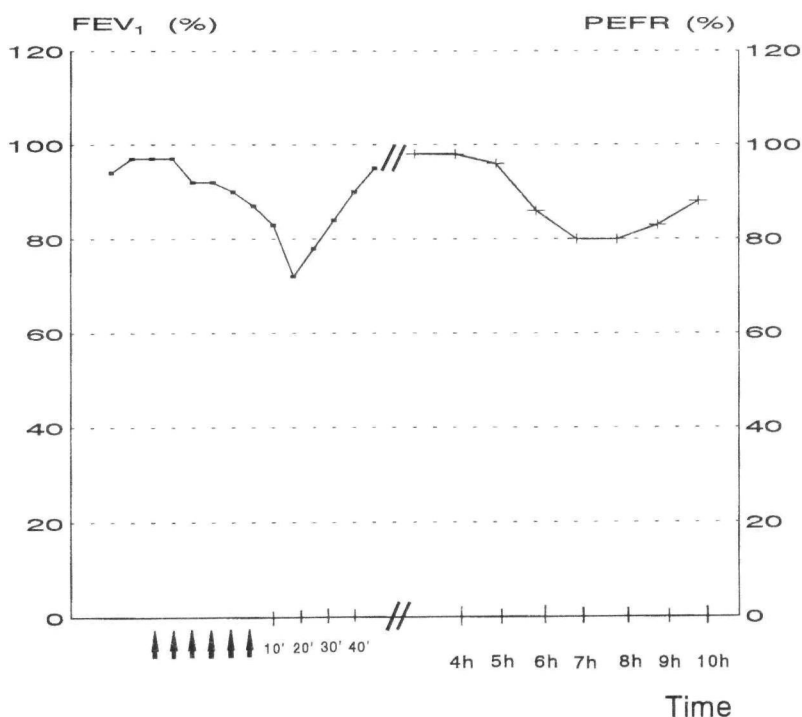
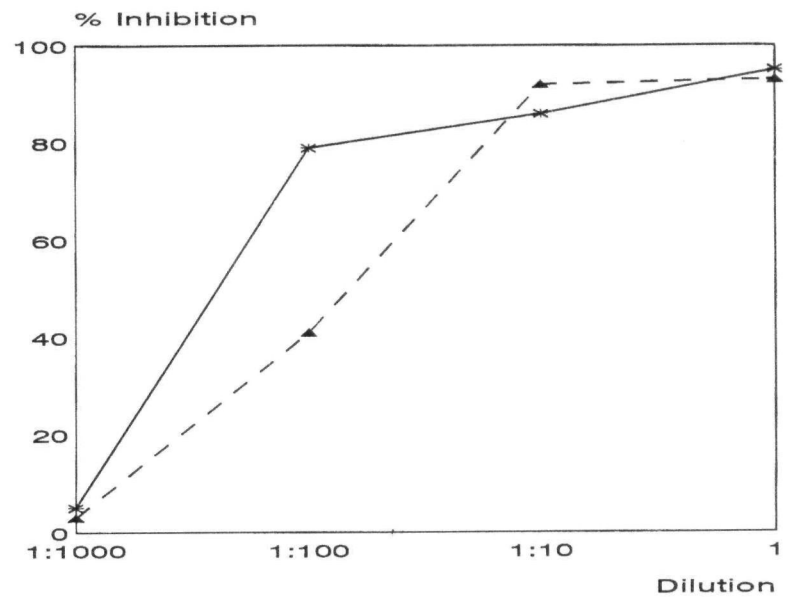


Fig. 1. Specific bronchial provocation test performed with PC pollen extract. Arrows represent progressive antigen inhalations, and time is indicated from 1:100 wt/vol solution inhalation.



Inhibitor agent: $\blacktriangle$ *P. dactylifera* $\ast$ *P. canariensis*

Fig. 2. RAST-inhibition studies performed with PC pollen-coated disks on incubation with PD pollen extract (discontinuous line) and PD pollen-coated disks on incubating with PC pollen extract (continuous line).

with oral antihistaminics, inhaled adrenergics, and inhaled corticosteroids, achieving total symptom relief.

Discussion

Despite their worldwide distribution in frost-free regions, little attention has been focused on palm trees as a possible cause of allergic disorders (9). The date palm is one of the most important kinds of palm trees, due to its edible fruit. Recently, two different reports (4, 8) have concluded that date palm pollen could be an important allergen in Mediterranean areas. By isoelectrofocusing and immunoblotting techniques, Fernandez (4) found that PD pollen contains at least two different allergens with a pI between 4.4 and 4.9. On RAST inhibition, no cross-reactivity was found with other pollens. Kwaasi et al. (7) have identified six major allergens by SDS-PAGE and immunoblotting, with molecular masses between 12 and 67 kDa. In this study, 15 out of 60 atopic patients showed positive SPT to PD pollen, suggesting that this pollen could be a major cause of allergic disease in that area.

The canary palm is another kind of palm tree, widely distributed as an ornamental tree, and closely related to the date palm. For esthetic purposes, gardeners prune dried leaves from PC regularly. In the present paper, we report a gardener with occupational sensitization to PC pollen. It is remarkable that our patient had no previous atopic disorders, a normal total IgE, and no sensitization to common aeroallergens. He showed an intense monosensitization to PC pollen that elicited bronchial asthma, rhinoconjunctivitis, and urticaria on exposure. We

have demonstrated the IgE-mediated nature of this reaction, by means of the positive SPT and the positive RAST to the PC extract. Specific BPT confirmed that the bronchial asthma was due to PC pollen, eliciting an immediate response. RAST-inhibition results suggest that PC pollen and PD pollen probably share common antigenic determinants, at least for the allergens to which our patient is sensitized.

We conclude that PC pollen is a potential cause of severe IgE-mediated sensitizations. Epidemiologic studies are necessary to assess the importance of this allergen among exposed gardeners and among the general population in PC-growing areas.

Acknowledgments

We would like to thank Teresa Martínez, Blanca González, Rosario Dávila, and Carmen Santana for their invaluable assistance in data collection. We also thank A. Vallecillo and B. Varga for their technical assistance, and Alergia e Inmunología, Abelló, Spain, for providing activated paper disks.

References

1. CESKA M, ERIKSSON R, VARGA JM. Radioimmunosorbent assay of allergens. *J Allergy Clin Immunol* 1972; 49: 1-9.
2. CHAI H, FARR RS, FROELICH LA, et al. Standardization of bronchial inhalation challenge procedures. *J Allergy Clin Immunol* 1975; 56: 323-7.
3. COCKCROFT DW, KILLIAN DN, MELLON JJ, et al. Bronchial reactivity to inhaled histamine: a method and clinical survey. *Clin Allergy* 1977; 7: 235.
4. FERNANDEZ J. Allergenic activity of date palm (*Phoenix dactylifera*). American Academy for Allergy and Immunology, 48th Annual Meeting, Orlando, Florida. Abstract no. 13. *J Allergy Clin Immunol* 1992; 89: 148.
5. GLEICH GJ, LARSON JB, JONES RT, BAER H. Measurement of the potency of allergy extracts by their inhibitory capacities in the radioallergosorbent test. *J Allergy Clin Immunol* 1974; 53: 158-69.
6. HARFI H, KWAASI AAA, TIPIRNENI P, PARHAR RS, GRAFF-LONNEVIG V, AL-SEDAIRY ST. Characterization of antigens and allergens of date palm (*Phoenix dactylifera*) pollen. *Allergy* 1992; 47: 535-44.
7. KWAASI AAA, PARHAR RS, TIPIRNENI P, HARFI H, AL-SEDAIRY ST. Major allergens of date palm (*Phoenix dactylifera* L.) pollen. *Allergy* 1993; 48: 511-18.
8. KWAASI AAA, TIPIRNENI P, HARFI H, PARHAR RS, GRAFF-LONNEVIG V, AL-SEDAIRY ST. Date palm (*Phoenix dactylifera*) pollen is a potent allergen. American College of Allergy and Immunology, 48th Annual Meeting, New York. Abstract no. 31. *Ann Allergy* 1992; 68: 782.
9. PLATTS-MILLS T, SOLOMON W. Aerobiology and inhalant allergens. In: MIDDLETON E, REED C, ELLIS E, ADKINSON N, YUNGINGER J, BUSSE W, eds. *Allergy: principles and practice*. 4th ed. St Louis, MO: Mosby, 1993: 469-528.
10. RYAN G, DOLOVICH MB, ROBERTS RS, et al. Standardization of inhalation provocation tests: two techniques of aerosol generation and inhalation compared. *Am Rev Respir Dis* 1981; 123: 195.

This document is a scanned copy of a printed document. No warranty is given about the accuracy of the copy. Users should refer to the original published version of the material.