ORIGINAL ARTICLE

Epidemiology of Cypress Pollen Allergy in Montpellier

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Abstract

Background: Cupressaceae pollen allergy is a worldwide winter pollinosis. Exposure to cypress pollen has increased enormously during recent decades, and cypress pollen allergy has become a major health problem, especially in Mediterranean countries.
Objectives: We aimed to evaluate the prevalence of cypress pollen sensitization and allergy in the Montpellier area and the symptoms presented by sensitized patients.
Methods: We included all 6185 consecutive patients who were referred to our center for any allergic disorder during a 36-month period. For each patient, we evaluated skin prick test results, allergy symptoms, pulmonary function test results, and the need for allergen immunotherapy.
Results: We found that 20.7% of patients were sensitized to cypress pollen and 46.4% presented symptoms during the pollen season. The main symptoms were rhinoconjunctivitis and asthma. Oral allergy syndrome to peach was detected in 4% of sensitized and symptomatic patients. Allergen immunotherapy was necessary to control symptoms in 57.9% of cases.
Conclusions: Cypress pollen allergy is one of the leading causes of respiratory allergy in the Montpellier area. Symptoms are often severe and include pollen-induced asthma. Moreover, many patients need allergen immunotherapy in order to achieve better control of their symptoms.

Key words: Allergy. Cypress. Epidemiology. Pollen. Sensitization.

Resumen

Introducción: La alergia a polen de cupresáceas constituye una polinosis invernal de carácter mundial. La exposición a polen de ciprés se ha incrementado enormemente durante las décadas recientes, y la alergia al polen de ciprés se ha vuelto un problema de salud mayor, especialmente en países mediterráneos.
Objetivos: Quisimos evaluar la prevalencia de sensibilización y alergia al polen de ciprés en el área de Montpellier y los síntomas presentados por los pacientes sensibilizados.
Métodos: Se incluyeron 6185 pacientes consecutivos que fueron referidos a nuestro centro por cualquier patología alérgica durante un periodo de 36 meses. Para cada paciente, evaluamos los resultado de pruebas prick, síntomas alérgicos, resultados de pruebas de función pulmonar, y la necesidad de inmunoterapia alergénica.
Resultados: Encontramos que 20,7% de los pacientes estaban sensibilizados al polen de ciprés y 46,4% presentaron síntomas durante la estación de polinización. Los síntomas principales fueron rinoconjuntivitis y asma. El síndrome de alergia oral con melocotón se detectó en 4% de los pacientes sensibilizados y sintomáticos. La inmunoterapia alergénica fue necesaria para controlar los síntomas en 57,9% de los casos.
Conclusiones: La alergia al polen de ciprés es una de las causas más importantes de alergia respiratoria en el área de Montpellier. Los síntomas son a menudo graves e incluyen asma inducida por polen. Por otra parte, muchos de los pacientes tienen necesidad de inmunoterapia para alcanzar un mejor control de los síntomas.

Palabras clave: Alergia, Ciprés, Epidemiología, Polen, Sensibilización.

Introduction

Cupressaceae pollen allergy is a worldwide pollinosis caused by several species. The role of *Cupressus* species in winter pollinosis has been clearly demonstrated [1,2]. Several members of the Cupressaceae family are important pollen-producing trees in Mediterranean countries (eg, France, Italy, Spain, Greece, and Israel), in Japan, and in the southwest part of the United States [1-4]. In the Mediterranean area, cypress is cultivated and planted for ornamental and gardening purposes [5]. Large-scale planting, however, has contributed to the spread of large amounts of pollen, which has become a major biological pollutant [6,7]. Exposure to cypress pollen has therefore been increasing steadily over the last few decades, especially in Mediterranean countries [8], and the prevalence of allergy to Cupressaceae pollen has also increased dramatically over the last 3 decades from 0.6% to 9.8% in the general population and from 9% to 35% in allergic patients [3,4], probably because the allergen load has become more intense [1-3,9]. The explanation for the differences between studies may be the high variability in the protein content and potency of the cypress pollen extracts used for skin testing in these surveys [3].

Pollination occurs earlier for *Cupressus arizonica* (starting in October in France, Italy, Israel, and in the southwest of the United States) than for *Cupressus sempervirens* (starting in January in the same countries). Pollination usually ends in February for *Cupressus arizonica* and in March (sometimes in April) for *Cupressus sempervirens* [9]. Symptoms during the early pollination period of Cupressus trees are often similar to those of seasonal illnesses such as the common cold or influenza; therefore, the real incidence of cypress pollen allergy could be underestimated [6]. Symptoms can appear at all ages. In the South of France, symptoms generally begin in January and end in late March. Cypress pollinosis is characterized by allergic symptoms such as conjunctivitis, rhinitis, and asthma [4,6]. Rhinoconjunctivitis seems to be the most impairing symptom in patients allergic to cypress pollen [4,9], although asthma is increasingly reported and cutaneous manifestations (such as dermatitis and/or urticaria) can occur through direct contact with pollen during tree pruning late in the year. Several cases of cross-reactive allergic reactions between cypress and peach have been reported, mainly as oral allergy syndrome (OAS) [6]. Diagnosis is easily suspected in the presence of winter rhinoconjunctivitis reported each year during the same period and confirmed by positive skin prick tests (SPT).

The aim of the present survey was to evaluate the incidence of cypress pollen allergy in the Montpellier area and to describe the characteristics of patients and the symptoms they present.

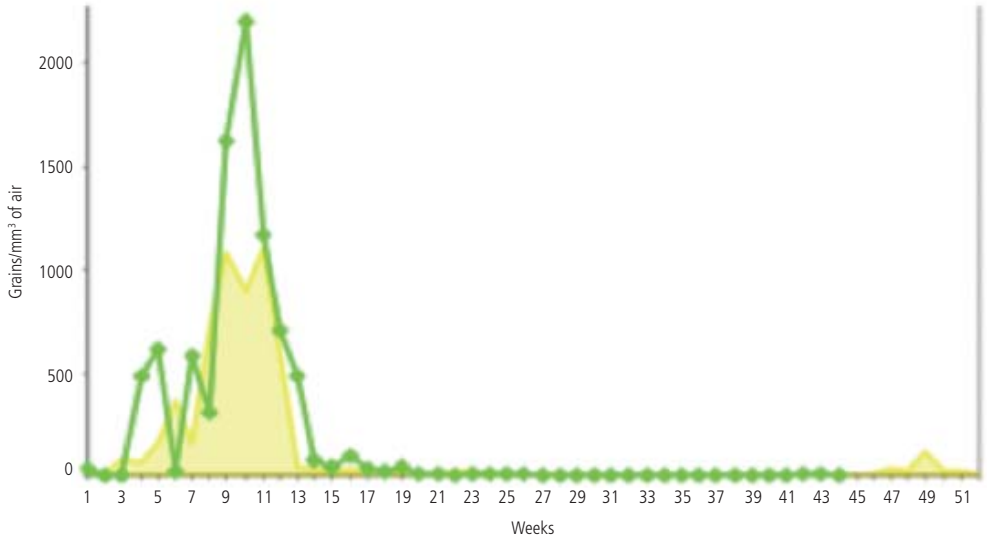

Figure Amount of cypress pollen released in the air in the Montpellier area (Unité de Service, d'analyses et d'expertises – Montpellier Supagro, www.france-pollen.com). The average air pollen concentration during the 2009-2010 season is shown in yellow; the average air pollen concentration in 2011 is shown in green.

Methods

Study Design

For the present cross-sectional study, we evaluated all 6185 consecutive patients who were referred to the Allergy Department of University Hospital of Montpellier (Montpellier, France) over a 36-month period (May 1, 2008 to April 30, 2011). The patients were referred to our clinic for respiratory allergy, drug hypersensitivity, food allergy, cutaneous allergy, occupational allergy, and venom allergy. All patients underwent SPTs with a battery consisting of histamine (10 mg/mL), inhalant allergens from the Montpellier area [10], peach, cockroach, peanut (Stallergènes SA), and natural peach (prick by prick). The concentration of allergen extracts was 100 immune reactivity units/mL. Each patient was tested on the volar surface of the forearm using a 23G intravenous needle. The skin reaction was recorded 15 minutes after the test by evaluating the skin response in comparison to the wheal induced by the histamine control test. A wheal diameter of at least half of the histamine wheal diameter or at least 3 mm was considered a positive reaction. All patients underwent pulmonary function tests.

We performed a physical examination to determine whether patients presented conjunctivitis, rhinitis, asthma, or cutaneous symptoms and verified whether these could be related to *Cupressus* pollinosis (presence or aggravation of symptoms during the first 3 months of the year and correlation with pollen counts). We also asked about symptoms during previous seasons. Pollen grains were collected using a Lanzoni pollen trap and counted by specialized palynologists (Unité de Service, d'analyses

et d'expertises – Montpellier Supagro) (Figure). We evaluated how many patients were already receiving sublingual immunotherapy (SLIT) and for how long. We also asked patients if they presented OAS when eating peaches.

In accordance with our institutional and ethics committee procedures, retrospective analyses of clinical records do not require the authorization of an ethics committee. However, we do require the patient's written informed consent to enable us to review the records. All patients gave their informed consent.

Statistical analysis

Data were described as frequencies and percentages or mean (SD).

Results

Population

A positive SPT result to the cypress pollen extract was detected in 20.7% of the patients referred to our clinic (1280 patients): 33.2% of the patients who attended for respiratory disorders only and 12.7% of those attending for other types of allergy (ie, drug hypersensitivity, food allergy, cutaneous allergy, occupational allergy, and venom allergy). A total of 428 (33.4%) of the 1280 sensitized patients consulted at our clinic between May 1, 2008 and April 30, 2009; 342 patients (26.7%) consulted between May 1, 2009 and April 30, 2010 and 510 patients (39.8%) between May 1, 2010 and April 30, 2011. Mean age was 34.6 (18.0) years, 44.1% (564) of the patients sensitized to cypress pollen were males, and 80.7% (1033) lived in the Montpellier area (Table 1).

Skin Prick Tests

Among the 1280 patients sensitized to cypress pollen, 8.1% (104 patients) presented a positive SPT result to peach extract, 12.9% (165 patients) had a positive prick-by-prick result to peach, 57.9% (741 patients) were positive to grass pollen, 58.9% (754 patients) to house dust mite, and 54.1% (692 patients) to dog or cat dander extract (Table 1). Monosensitization to cypress pollen was detected in 217 patients (17.0%) (Table 2).

Pulmonary Function Tests

The mean forced expiratory volume in the first second of expiration (FEV_1) in the sensitized population was 97.8% (17.2%) of the predicted value; if sensitized and symptomatic/allergic patients were taken into account, it was 98.7% (16.6%). After pharmacological bronchodilation, FEV_1 improved by 4.8% (5.0%) in the sensitized population and 4.5% (4.5%) in the sensitized and symptomatic/allergic population (Table 1 and Table 3).

Table 1. Characteristics of the Patients Sensitized to Cypress Pollen

	No.	%
Mean (SD) age, y	34.6 (18.0)	
Males	564	44.1
Living in Montpellier	1033	80.7
Skin Prick Test		
Monosensitized to cypress pollen	217	17.0
Positive to peach extract	104	8.1
Positive to peach (prick by prick)	165	12.9
Positive to grass pollen	741	57.9
Positive to house dust mite	754	58.9
Positive to animal dander	692	54.1
Symptoms		
Allergy symptoms during the pollen season	594	46.4
Conjunctivitis	563	44.0
Rhinitis	871	68.0
Asthma	524	40.9
Cutaneous symptoms	214	16.7
Oral allergy syndrome to peach	29	2.3
Pulmonary Function Test		
Mean (SD) FEV_1, % predicted	97.8 (17.2)	
Mean (SD) change in FEV_1 after bronchodilation, % predicted	4.8 (5.0)	

Abbreviation: FEV_1, forced expiratory volume in the first second of expiration.

Table 2. Characteristics of Patients Monosensitized to Cypress Pollen

	No.	%
Monosensitized to cypress pollen	217	17.0
Positive peach extract prick	8	3.7
Positive peach prick by prick	13	6.0
Oral allergy syndrome to peach in monosensitized patients	4	1.8

Table 3. Characteristics of the Patients Sensitized and Symptomatic/Allergic to Cypress Pollen

	No.	%
Allergy symptoms during the pollen season	594	46.4
Positive peach extract prick	38	6.4
Positive peach prick by prick	48	8.1
Symptoms		
Conjunctivitis	382	64.3
Rhinitis	548	92.3
Asthma	233	39.2
Cutaneous symptoms	46	7.7
Oral allergy syndrome to peach	24	4.0
Pollen-related asthma	107	18.0
Sublingual Immunotherapy		
Allergic patients undergoing sublingual immunotherapy	344	57.9
Sublingual immunotherapy for at least 3 years	60	17.4
Pulmonary Function Tests		
Mean (SD) FEV_1 % predicted	98.7 (16.6)	
Mean (SD) change in FEV_1 after bronchodilation, % predicted	4.5 (4.5)	

Abbreviation: FEV_1, forced expiratory volume in the first second of expiration.

Symptoms

Conjunctivitis was reported in 563 patients (44.0%), rhinitis in 871 (68.0%), asthma in 524 (40.9%), and cutaneous symptoms in 214 (16.7%) (Table 1). OAS to peach was recorded in 29 patients (2.3%) (Table 1), and 594 (46.4%) of the sensitized patients presented allergic symptoms during the cypress season (January-March). These findings correlated with the pollen counts (Figure).

In the group of sensitized and symptomatic patients, 382 individuals (64.3%) reported having conjunctivitis, 548 (92.3%) rhinitis, 233 (39.2%) asthma, and 46 (7.7%) cutaneous symptoms (Table 3). OAS to peach was recorded in 4.0% (24 patients): 38 patients (6.4%) had a positive SPT result to peach extract, while 48 patients (8.1%) had a positive prick-by-prick result to peach. Overall, 71 patients (12.0%) showed a positive skin reaction to at least 1 of these 2 tests (Table 3).

In the patients who were sensitized and allergic to cypress pollen, asthma was pollen-related, with worsening of symptoms and an increased need for rescue medication after exposure to cypress pollen in 107 cases (18.0%) (Table 3). When considering only asthmatic patients who were sensitized to cypress pollen and symptomatic during the pollen season (233 patients), the percentage of pollen-induced asthma rose to 45.9%.

Of all the patients who were monosensitized to cypress pollen (217 patients), only 17 (7.8%) presented a positive result to peach extract SPT, peach prick-by-prick, or both; 4 patients had a positive skin test to peach extract only and 8 patients presented a positive skin test result to prick-by-prick testing with peach (Table 2).

All patients whose rhinoconjunctivitis symptoms were not properly controlled by regular and rescue medications (eg, antihistamines and nasal corticosteroids) were offered SLIT. In the present cohort, of all the patients sensitized to cypress pollen and showing symptoms during the pollen season, those who were advised to undergo cypress pollen SLIT (344 patients, 57.9%), agreed to do so. In the group of patients who underwent SLIT, 60 patients had been taking treatment for at least 3 years at the time of our survey (Table 3). If we consider only patients who were symptomatic and monosensitized to cypress pollen (217 patients), 35 underwent SLIT (16.1%) and 14 had been taking the treatment for at least 3 years at the time of the study.

Discussion

The first cases of rhinoconjunctivitis due to Cupressaceae pollen exposure were described in 1945 in South Africa [11] and in 1962 in France [12]. Since the end of the 1970s, total annual concentrations of airborne Cupressaceae pollen have increased progressively in several areas of the Mediterranean [9]. For many years, cypress pollen allergy was considered a rare disease, and its prevalence was underestimated due to confusion with winter respiratory tract infections and the low potency of allergen extracts [7].

Recent increases in the prevalence of this pollinosis are thought to be due to the extensive planting of cypress trees for different purposes [6]. Moreover, cypress pollen counts during winter (January-March) are usually 2- to 5-fold higher than Poaceae pollen counts in spring and are found in the atmosphere for 3 months (as opposed to 2-3 weeks with Poaceae). The prevalence of allergy to Cupressaceae pollen has therefore increased dramatically over the last 3 decades [1,4,13]. In recent years, widespread use of cypress trees means that clinicians need to be particularly aware of this winter allergy [14].

As the only other winter allergen in the Montpellier area, ash, is not clinically significant, Cupressaceae pollinosis has become the leading cause of allergy and consultation for allergy in winter in our area.

In the present study, we show that more than 20% of the patients referred to our clinic for any allergic disorder present sensitization to cypress pollen. In our previous analysis of patients presenting with respiratory disorders, 34% of the sample were sensitized to cypress pollen [10], a finding that is confirmed in the present study. Moreover, we observed that almost half of the patients sensitized to cypress pollen (46.4%) were symptomatic during the cypress pollen season. Our clinical experience indicates that atopic patients need to be living in the area for at least 2-3 years before becoming sensitized to cypress pollen and 5-8 years before showing symptoms related to pollen exposure (personal data).

Rhinoconjunctivitis is a major problem for patients with allergy to cypress pollen. Allergic asthma also affects this population, although few studies report this outcome (18% of our allergic population). The prevalence of pollen-induced asthma in asthmatic patients symptomatic to cypress pollen has increased to 45.9%, indicating that almost half of all patients who present with allergic symptoms during the first 3 months of the year and who are known to be asthmatic show a general worsening of their respiratory function and require more rescue medication during the cypress pollen season.

Peach is a well-documented source of allergens that are very prevalent in the Mediterranean area. Local reactions (labial edema and lingual pruritus) and systemic reactions (urticaria, bronchospasm, and anaphylactic shock) have been reported after ingestion of fresh or processed fruit. About 4% of the allergic patients in the present study were affected by OAS to peach, even though the clinical relationship between this syndrome and cypress pollinosis is not fully understood. However, clinical and in vitro data show that other types of cross-reactivity between fruit and pollen mainly involve the Bet v 1 family or lipid transfer proteins [15-17]. The possibility of experiencing OAS to fruit in patients sensitized to both allergens during the pollen season is thought to increase as larger amounts of pollen are released into the atmosphere [17]. Nevertheless, as peaches are not typically present during the pollen season, such assumptions should be further investigated. In our cohort, this correlation did not become any stronger in patients monosensitized to cypress pollen. It is noteworthy that none of our patients had severe forms of peach allergy; therefore, we could speculate that none of them was sensitized to the 15-kDa cypress lipid transfer protein recently described by Sánchez-López et al [15].

A potential limitation of the present study is that the patients consulting at our clinic had already seen a general practitioner, who felt they needed more specialized care or who was not able to control their symptoms. For the same reason, the patients included in the present cohort are those who present more severe symptoms. Therefore, on the one hand, we may be underestimating the real percentage of sensitized patients, since most are probably treated in a general practitioner's outpatient clinic, and, on the other hand, the fact that our area is known to have a high concentration of cypress trees could reasonably be expected to lead to an overestimation of the frequency of the disease.

In this study, we did not record all the treatments taken by the patients. However, symptoms cannot be controlled using symptomatic drugs (eg, H_1 antihistamines, nasal corticosteroids, and other bronchial anti-inflammatory drugs) in more than 50% of cypress-allergic patients, and allergen immunotherapy must be administered.

In conclusion, our data show that cypress pollen allergy is a major health problem in the Montpellier area throughout the year and the main respiratory allergy reported by our patients. Moreover, even though cypress pollen allergy is known to be associated with rhinitis and conjunctivitis, a closer follow-up of respiratory disease in asthmatic patients is necessary, since this population may experience less well-controlled asthma during the pollen season, as shown for other types of pollinosis in other regions [16]. Prospective studies are needed to confirm this statement.

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