

Relationship of clinical and aerobiological pollen data in the north-west of Spain

A. Dopazo, M.^a J. Aira, M. Armisen*, and C. Vidal*

Department of Plant Biology, School of Pharmacy, and *Allergy Unit, Hospital de Conxo (Complejo Hospitalario Universitario de Santiago), Santiago de Compostela, Spain.

SUMMARY

Background: few studies report clinical and aerobiological pollen data in the north-west of Spain, a region similar to northern and central Europe. Moreover, it is difficult to obtain patients' collaboration in filling out symptom cards. The aim of this study was to establish a relationship between pollen types and clinical data obtained through questionnaire and telephone calls.

Patients and methods: from January to December 2000, 24 patients aged 28 ± 10.6 years and allergic to pollens were studied. The seasonal and hourly rhythm of symptoms and their intensity were obtained monthly by telephone calls. Atmospheric pollen was collected over the same period using a Hirst-type volumetric pollen sampler.

Results: the most important pollen types recorded were *Poaceae*, *Betula*, *Parietaria* and *Plantago*. Most patients (83 %) showed symptoms during March and in the period between May and July (99 %), which coincided with the greatest quantity of atmospheric pollen. Fifty-six percent of the patients complained of symptoms during the first hours of the morning, 63 % during the central hours of the day and 22 % at nightfall. In specific sensitizations, symptoms were more evident during the hours of maximum atmospheric levels of their taxa.

Conclusions: the method employed in the present study to obtain information on patients' symptomatology (telephoning their homes once a month) proved useful and revealed a clear relationship between the presence of certain pollens in the atmosphere and the development of symptoms.

Key words: North-west of Spain. Pollen. Aerobiology. Asthma. Rhinoconjunctivitis.

Allergol et Immunopathol 2002; 30(2):74-78.

INTRODUCTION

Although Spain belongs, from a geographical point of view, to Southern Europe and the so-called Mediterranean area, this is not the case, aerobiologically speaking, of all of its territory. Thus, NW Spain, a wet region with mild temperatures, is more similar, as far as pollination is concerned, to Northern and Central Europe (1-3). It is well known that the presence of pollen in the atmosphere is capable of triggering respiratory problems in allergic patients. However, the minimum levels of atmosphere pollen required to produce symptoms is only known for some pollen types (4, 5). It has thus been verified that 80 % of patients allergic to *Betula* pollen show symptoms when its atmospheric level is greater than 30 grains/m³ (4), and the same is true of *Poaceae* pollen and the corresponding allergic patients when it surpasses 50 grains/m³ (5). There are few studies relating clinical and aerobiological data in NW Spain (6-8).

The aim of this study was to establish a relationship between pollen types detected in the atmosphere and clinical data obtained by questionnaire, and telephone calls in an area of NW Spain.

PATIENTS, MATERIAL AND METHODS

Patients

In this prospective study, a total of 24 patients (12 men and 12 women) aged 28 ± 10.6 (range,

7-51 years) were studied in the Allergy Unit from January to December 2000. All of the patients were found to be allergic to pollens on the basis of case history (rhinoconjunctivitis in 23, and/or bronchial asthma in 10), and having positive skin prick tests with pollens: *Alnus glutinosa* (n = 2 patients), *Artemisia vulgaris* (n = 3), *Betula alba* (n = 5), *Chenopodium album* (n = 6), *Corylus avellana* (n = 4), *Fraxinus excelsior* (n = 3), *Olea europaea* (n = 1), *Parietaria judaica* (n = 1), *Plantago lanceolata* (n = 10), *Platanus acerifolia* (n = 2), *Quercus robur* (n = 3), and several *Poaceae*: *Anthoxanthum odoratum* (n = 14), *Cynodon dactylon* (n = 10), *Lolium perenne* (n = 22), and *Phragmites communis* (n = 15). Twenty-one patients had more than one sensitisation. No patient presented sensitisation against *Cupressus sempervivens*, *Ligustrum vulgare*, *Pinus radiata*, *Rumex*, *Salix*, *Urtica dioica*, house dust mites, moulds and cat and dog dander.

All patients came from the health-care area of Santiago. The city is located in the NW of Spain (42 degrees 53'N, 8 degrees 32'W) with nearly 100,000 inhabitants. Meteorological data during 2000 (supplied by the Observatorio Astronómico Ramón María Aller) showed a total annual precipitation of 2,472 mm, April being one of the wettest month (average daily value of 16 mm) and June the driest. The average monthly temperature in winter months oscillated between 7.4 °C and 13.6 °C. Temperatures significantly increased from May onwards with maximum daily values of 24.8 °C in August.

Study methods

Seasonal and hourly rhythm of symptoms and their intensity during previous years were assessed by questionnaire at the first visit. The same data for the year 2000 was obtained monthly, in which case a researcher telephoned each patient once a month in order to obtain information about his health during the previous month. Symptoms were classified as slight, moderate or intense (table I).

Airborne pollen concentration

Atmospheric pollen was collected between January to December 2000 using a Hirst-type volumetric pollen sampler, set up on the top of a building in the centre of Santiago de Compostela, at 26 metres above ground level. Samples were processed following the methodology proposed by the Aerobiological European Network. Mean daily pollen

Table I
Severity of symptoms according to data obtained by telephone calls

Symptoms	Blocked nose	Sneezing	Itchy eyes	Daily activity
Slight	Short time	Limited	Esporadic	Unaffected
Moderate	Several hours	Abundant	Habitual	Difficult
Intense	All day	Continuous	Constant	Impeded

concentration (grains/m³) was measured. The model of Galán et al. was employed to evaluate the hourly diurnal variation of principal pollen types (9). Data was expressed as the proportion of pollen trapped during each hour of the day.

RESULTS

Airborne pollen counts

The total atmospheric pollen recorded in Santiago during the study period was 12,698 pollen grains. The most important types of pollen detected were *Poaceae* (3,181 grains –25 % of the total–), *Betula* (2,888 grains –23 %–), *Parietaria* (1,001 grains –8 %–), *Plantago* (581 grains –5 %–), and, to a lesser extent, *Quercus*, *Platanus*, and *Alnus*. *Artemisia*, *Chenopodium*, *Corylus*, *Fraxinus*, and *Olea* pollens were barely presented (< 0.1 %).

In relation to mean daily concentration, more than 30 grains/m³ of *Betula* were detected during 21 days, and more than 80 grains/m³ during 12 days. Levels greater than 10 grains/m³ of *Quercus*, *Alnus*, and *Platanus* were recorded during 14, 7 and 9 days, respectively. On June and July, *Poaceae* pollen reached 50 grains/m³ during 20 days.

Relationship between allergic symptoms and pollen counts

From a clinical point of view, most patients showed symptoms during March (20/24, 83 %) and in the period between May and July (23/24), coinciding with the greatest quantity of atmospheric pollen. The sharp decrease in allergy symptoms in April may be related to the scarcity of pollen due to the effect of rainfall, since this month was the rainiest in the year apart from winter (439 mm) (fig. 1).

The intensity of symptoms according to the monthly questionnaire was slight (scale 0-1) during the first months of the year (from January to March) and affected 50 % (12/24 patients) of the studied po-

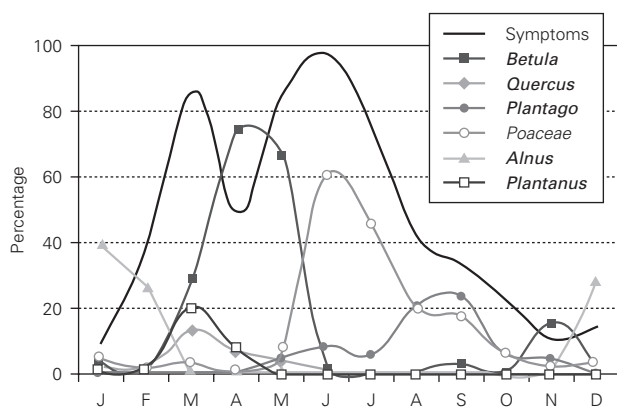


Figure 1.—Monthly frequency of symptoms, rainfall and pollen data.

pulation, although 21 % of the patients (5/24) reported the same kind of symptoms throughout the rest of the year. Starting from May the intensity of symptoms increased to moderate (scale 1-2), affecting 33 % (8/24) of the patients. Symptomatology became intense in the following months, affecting 67 % (16/24) of the individuals in June. From September onwards between 4-14 % of the patients showed moderate symptoms, which may be related mainly to pollen of *Plantago*, late-flowering *gramineae* and

Urticaceae. *Parietaria* pollen (which caused skin sensitisation in 8 % of the sample) reached average daily concentrations of more than 10 grains/m³ during 34 days.

In relation to diurnal variations (fig. 2), 56 % of the cases showed symptoms during the first hours of the morning, generally on waking or going outside; 63 % of the patients experienced allergic reactions during the central hours of the day and 22 % at nightfall. With respect to each sensitization, 80 % of the patients allergic to *Betula* showed symptoms during this taxon's hours of maximum atmospheric levels, i.e. in the afternoon. In the same way, all the patients that skin-tested positively for *Quercus* showed allergic symptoms at night, coinciding with this pollen type's maximum atmospheric presence in the year 2000. In the case of *Plantago*, 70 % of the patients coincided with a greater allergic incidence around 2 pm and in that of *gramineae*, 59 % of the patients experienced symptoms in the evening, coinciding with this pollen type's hours greatest pollen concentration.

DISCUSSION

Coinciding with studies carried out in other towns in the NW Iberian Peninsula (6), pollinosis sufferers in

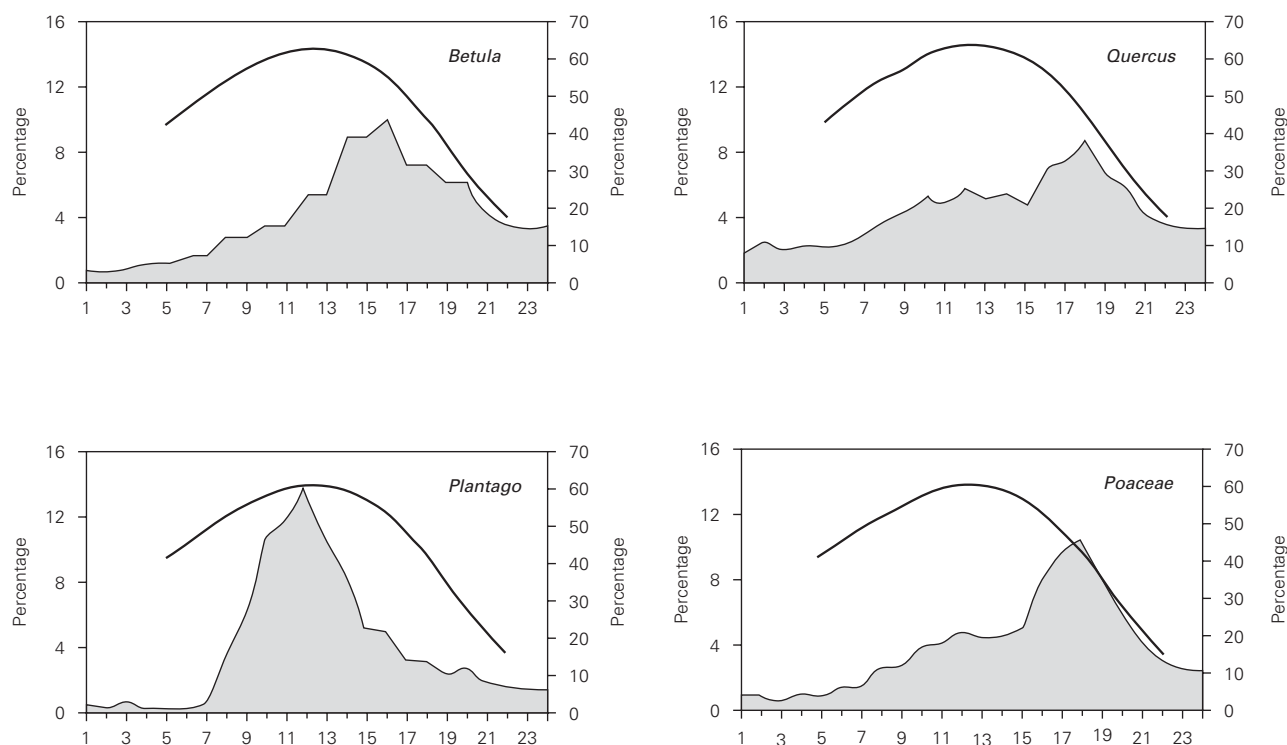


Figure 2.—Relationship between frequency of symptoms and intradiurnal pollen representation. X-axis, hours of the day. Right Y-axis, percentage of symptomatic patients. Left Y-axis, percentage of each pollen type in the atmosphere.

the Santiago de Compostela health district are predominantly sensitised to the pollen of *gramineae* (*Poaceae*). The results obtained in this study confirm the clinical relevance of this sensitisation in direct correspondence with the presence of such pollens in the atmosphere during June and July. Despite the frequency with which the patients show other sensitisations, these seem to be of limited clinical importance since the presence of those pollens hardly produced any intensification of symptoms. Specifically, the ten patients allergic to *Plantago* did not seem to be affected at all by the presence of this pollen during August and September, when the levels were greatest, since there was no modification in the decline of symptoms. Another important taxon from an aerobiological point of view, specially in the Mediterranean area and also detected in some coastal regions of Galicia, is *Parietaria* (8, 10). Nevertheless, the prevalence of sensitisation to this plant is very low in the study population and its atmospheric pollen levels only accounted for a minority of the total pollens recorded. It is therefore of limited interest regarding the study population.

In relation to allergy to arboreal pollen types, while *Betula* is the genus that most frequently produces sensitisation, it seems that the symptomatology detected in March may be attributed to *Platanus* and *Quercus*; although *Betula* levels are on the increase then, no worsening of symptoms was detected during its maximum pollination in April. This fact should be analysed with precaution since April was the month with the highest rainfall (439 mm). It is well known that this phenomenon may exert a cleansing influence on the atmosphere and decrease pollen counts. The *Betula* figures recorded in the year 2000 were lower than those of previous years (11). However, they were sufficiently high in order to trigger, at least in theory, symptoms in allergic individuals. This point should therefore be analysed in future studies with a greater number of patients. Lastly, the high *Alnus* pollen concentrations detected at the end of winter did not seem to produce symptoms in 8 % of the sensitised individuals.

With regard to the hourly relationship between symptoms and presence of pollen, the obtained results confirm the worsening of symptoms from 9 am onwards, peaking during the central hours of the day. It is surprising that the maximum pollen levels, which are recorded during the afternoon hours, do not appear to affect the patients. One possible explanation is the improvement associated with the intake of symptomatic medication at the moment when patients feel worse. The fact of staying at home undoubtedly justifies the slight symptomato-

logy detected during the night and first hours of the morning.

Finally, it is worth pointing out that the method employed in this study in order to obtain information about the patients' symptomatology –telephoning their homes once a month– proved to be useful and enabled the objectification of a clear relationship between the presence of certain pollens in the atmosphere and the appearance of symptomatology. This monitoring method has the advantage of obtaining information directly from the patient with a periodicity that enables him to remember his state of health during the previous weeks. Its disadvantages are the need for personnel to carry out the aforementioned surveys and not obtaining detailed information on a daily basis. The latter seems to be less important judging from the experience of previous studies, which showed that patients who were given symptom cards to be filled out daily only did so shortly before consultation (12).

RESUMEN

Antecedentes: desde el punto de vista aerobiológico, el noroeste peninsular se aproxima más al Centro y Norte de Europa que al área mediterránea. Son escasos los estudios relacionando síntomas y presencia de polen, en esta zona. Además, es difícil contar con la colaboración de los pacientes para rellenar diarios de síntomas que faciliten esta evaluación. El presente estudio se diseñó para comprobar la posible utilidad de un seguimiento telefónico de los síntomas y su relación con la presencia de pólenes en el ambiente.

Pacientes y métodos: se incluyó un total de 24 pacientes adultos, alérgicos a pólenes y cuyo seguimiento se realizó de enero a diciembre del año 2000. Se registró el ritmo estacional y horario de los síntomas obtenido con llamadas telefónicas que mensualmente realizó un investigador. La recogida de pólenes se realizó con un captador volumétrico tipo Hirst situado en el área de influencia a la que los pacientes pertenecían.

Resultados: los tipos polínicos presentes con mayor relevancia en la atmósfera fueron *Paraceae*, *Betula*, *Parietaria* y *Plantago*. La mayoría de los pacientes mostraron síntomas en el mes de marzo (83 %) mientras que en el período de mayo a julio el 99 % de los sujetos se encontraron afectados, coincidiendo con los niveles más elevados de pólenes. Respecto a las variaciones horarias, el 56 % de los pacientes se encontraron peor en las primeras horas de la mañana, el 63 % en las horas centrales del día y

tan sólo un 22 %, al anochecer, todo ello en directa relación con la presencia de los distintos tipos polínicos.

Conclusiones: el método empleado en el presente estudio –llamadas telefónicas con periodicidad mensual– parece útil en el seguimiento de los síntomas, pudiendo detectarse una relación con la presencia de los distintos tipos polínicos en la atmósfera.

Correspondence:

C. Vidal, M.D.
Unidad de Alergia
Hospital de Conxo
(Complejo Hospitalario Universitario de Santiago)
Rúa Ramón Baltar, s/n.
15706 Santiago de Compostela.
Spain.

Palabras clave: Noroeste de España. Polen. Aerobiología. Asma. Rinoconjuntivitis.

REFERENCES

1. Dopazo A, Jato V, Aira MJ. Allergenic pollen types in the atmosphere of Santiago de Compostela (NW Spain): a pollen calendar for the last six years. *Botanica Helvetica* 2000;110:51-60.
2. Spiekma FTM, Emberlin J, Hjelmroos M, Jäger S, Leuschner RM. Atmospheric birch (*Betula*) pollen in Europe: trends and fluctuations in annual quantities and the starting dates of the season. *Grana* 1995;34:51-7.
3. Jäger S, Nilsson S, Berggren S, Pessi AM, Helander M, Ramfjord H. Trends of some airborne tree pollen in the Nordic countries and Austria, 1980-1993. *Grana* 1996;35:171-8.
4. Vilander M, Koivikko A. The seasonal symptoms of hyposensitized and untreated hay fever patients in relation to birch pollen counts: correlations with nasal sensitivity, prick tests and RAST. *Clin Allergy* 1978;8:387-96.
5. Negrini AC, Voltoni S, Troise C, Arobba D. Comparison between *Urticaceae* (*Parietaria*) pollen count and hay fever symptoms: assessment of a threshold-value. *Aerobiologia* 1992;8:325-9.
6. Ferreiro M, Núñez R, Rico MA, Soto T, López R. Pólenes alérgicos y polinosis en el área de La Coruña. *Alergol Inmunol Clin* 1998;13:98-101.
7. Belmonte J, Roure JM, March X. Aerobiology of Vigo, North-western Spain: atmospheric pollen spectrum and annual dynamics of the most important taxa, and their clinical importance for allergy. *Aerobiologia* 1998;14:155-63.
8. Vidal C, Dopazo A, Aira MJ. *Parietaria* pollinosis in an Atlantic area: clinical and playnological data. *J Investig Allergol Clin Immunol* (in press).
9. Galán C, Tormo R, Cuevas J, Infante F, Domínguez E. Theoretical daily variations patterns of airborne pollen in South-West of Spain. *Grana* 1991;30:201-9.
10. D'Amato G, Dal Bo S, Bonini S. Pollen-related allergy in Italy. *Ann Allergy* 1992;68:433-7.
11. Aira MJ, Jato V, Iglesias I. *Alnus* and *Betula* pollen content in the atmosphere of Santiago de Compostela, North-Western Spain (1993-1995). *Aerobiologia* 1998;14:135-40.
12. Quirce S, Contreras G, Dybuncio A, Chan-Yeung M. Peak expiratory flow monitoring is not a reliable method for establishing the diagnosis of occupational asthma. *Am J Respir Crit Care Med* 1995;152:1100-2.