

Pollen Allergy in the Mediterranean Area

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ABSTRACT

Pollen allergy has a remarkable clinical impact in the Mediterranean area, and there is evidence that in this area the prevalence of allergic reactions induced by pollen is increasing, affecting more than 10% of the population.

This increasing frequency should be related, among other factors, to the increasing atmospheric levels of photochemical smog and to the interrelationship between the chemical components of air pollution and pollen allergens. However, the increasing mobility of people for business and leisure has led to a need for reliable information about exposure to seasonal airborne allergens during travel abroad.

In Mediterranean area, over the last 10 years or so, aeropalynological and allergological studies have progressed to meet this need, and extensive international networks now provide regular pollen and hay-fever forecasts.

The mild winters and dry summers of Mediterranean area favor the production of pollen types (e.g. the genera *Parietaria*, *Olea*, and *Cupressus*) that are rarely found in central and northern Europe, but also in Mediterranean area the pollen map is changing as a result of cultural factors (e.g. importation of plants for urban parklands) and greater international travel (e.g. the expansion of the genus *Ambrosia* (ragweed) in France, northern Italy and former Yugoslavia).

KEY-WORDS: Hay fever; Mediterranean area; Pollen allergy; Pollinosis; Respiratory allergy.

There is a body of evidence which suggests that the frequency of atopic diseases, particularly those induced by pollen allergens (rhinoconjunctivitis and/or bronchial asthma) is increasing and atopic diseases have become more common during the past two decades.¹⁻⁷ This trend is also evident in the Mediterraneans, where several concurrent climatic (mild winters and dry summers) and geographical factors promote the growth of a characteristic vegetation with the production of various

types of allergenic pollen⁸⁻¹⁰ such as those from *Parietaria*, *Olive* and *Cupressaceae*, different from that of central and northern Europe.

Data on the presence and prevalence of allergenic airborne pollens, obtained from both aerobiologic studies and allergologic investigations, make it possible to design a pollen calendar with the approximate flowering period of the plants in the area in which the sampling is carried out. In this way, even though allergenic plants experience considerable fluctuations in pollen production and dispersal from year to year, reflecting patterns in pre-seasons weather and the conditions prevailing at the time of anthesis, it is usually possible to compare the chances of high atmospheric allergenic pollen concentrations in different areas, which can provide useful information for the allergic patient when his/her trips are being planned or in preventing the possible appearance of severe hay fever symptoms by appropriate medication or other measures.

The aerobiologic sampling of the pollen content of the atmosphere, carried out in various Mediterranean cities, led us to identify three pollen seasons:⁹⁻¹²

- a low winter season (from December to end of March), marked by the presence of the pollens of such trees as *Cupressaceae* (*Cupressus* and *Juniperus*), *Corilaceae* (Hazel), *Acacieae* (Mimosa) and some *Betulaceae*.
- a high spring-summer pollen season (from April to July) of marked allergological interest, dominated by the pollination of *Gramineae*, *Parietaria* and *Olea*. In this period, from March to May, we also find the *Platanus* pollination, which has some allergenic importance in areas such as southern France and Spain.¹³
- a summer-autumn season (from August to October), in which we find the second, lower peak of *Parietaria* and sometimes of *Gramineae* and the pollens of herbaceous plants, such as mugwort and *Chenopodiaceae*.

For a clearer understanding of the aerobiological and clinical aspects of pollinosis in the Mediterranean area, we shall examine grass, trees and weeds separately.

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GRASSES

Grass pollen is the major cause of pollinosis in many parts of the world and grass-induced pollinosis is the most common pollen allergy also in the Mediterranean area.^{7,9,10} Until the beginning of April no considerable atmospheric concentrations of grass pollen are reported in the Mediterranean area.¹¹ From the second half of April the pollination period with emergency of clinical symptoms starts in central-southern Italy, Greece and southern Spain, followed by Portugal, northern Spain, southern France, northern Italy and former Yugoslavia. The seasonal pollen concentration and grass pollinosis symptomatology increase progressively in May and June in about all European Mediterranean areas, decreasing progressively in July.

The concentration of airborne grass pollen in the atmosphere is frequently related to the degree of symptoms in pollinosis patients. In Naples, a concentration of more than 50 grains/m³ induces symptoms in all pollinosis patients.¹⁰ In Bilbao (Spain), 100% of pollinosis patients experienced symptoms when the pollen count was above 37 grass pollen grains/m³.¹⁴ The most abundant airborne grass pollen originates from tall meadow grasses like timothy (*Phleum pratense*), orchard grass (*Dactylis glomerata*) and meadow foxtail (*Alopecurus pratensis*). However, with very few exceptions, all grass pollen types show a very high degree of cross reactivity.

Even though *Gramineae* are the most important cause of pollinosis in the Mediterranean area, other typical pollen grains play an important role.

WEEDS

Urticaceae:

Parietaria is the main allergenic genus of the *Urticaceae* family. Factors influencing the pollen output include temperature, humidity, and light intensity. The anthers of *Parietaria* open during favourable weather, particularly when it is warm and dry. They tend to open during daylight hours, from early morning to late afternoon. The duration of *Parietaria*'s pollen season varies with the climate. In southern Italy it can persist from February to December, resulting in almost perennial symptoms, whereas in northern Italy and southern France and on the Mediterranean coast of Spain, pollination occurs on average between April and September.^{9,10} The extraordinarily long persistence in the atmosphere of *Parietaria* pollen in the Mediterranean area is responsible for a multiseasonal symptomatology.^{9,10} Bronchial asthma or its equivalents, such as cough (severe in some cases) associated with rhinoconjunctivitis, is present in more than 50% of the monosensitized *Parietaria* patients in central and southern Italy, reaching a peak of 60% in Naples.

The frequency of positive skin prick tests to *Parietaria* pollen has increased in the Naples area during the last 15 years, even if the atmospheric concentration of this pollen has not increased. This is probably due to the concomitance of three elements: year-long sunny warm weather; heavy urban traffic with high level of photochemical smog; abundance of *Parietaria* plants inside the city. As a consequence, Naples should be considered a model with which to study the interaction between airborne pollutants and respiratory allergy.^{4,15}

Sensitization to allergens carried out by *Parietaria* pollen grains or by other plant components (16,17) greatly varies in the Mediterraneans according to the geographic area and is more common among people living in coastal towns than among country dwellers and inland urban inhabitants.¹⁸

Pollinosis caused by *Parietaria* is less frequent before the age of 10 years. A greater frequency of reactivity to *Parietaria* in women than in men has been reported in Europe.⁷

The prevalence of sensitization to *Parietaria*, considering mono and polysensitization, among pollinosis patients ranges from 40 to 80% in southern Italy and the Ligurian coast, from 10 to 60% in Mediterranean Spain, and it is approximately 45% in southern Greece and 25% in Mediterranean France.⁷

Bronchial asthma or its equivalents, almost always associated with rhinoconjunctivitis, is present in 52% of the monosensitized *Parietaria* patients in central and southern Italy, reaching a peak of 60% in Naples.^{10,12}

Compositae (Artemisia and Ambrosia):

Artemisia vulgaris, which grows throughout Europe, is the most common species of the genus *Artemisia*. *Artemisia annua* and *verlotorum* grow prevalently in southern Europe.¹⁹

Mugwort is present in both urban and suburban areas and in the Mediterraneans flower from September to the end of October. The frequency of sensitization to mugwort among pollinosis patients ranges between 3% and 10%.^{23,24}

Ambrosia (ragweed). Unlike in the USA, where *Ambrosia* pollen is the aetiological agent in about half of all cases of pollinosis, in the Mediterraneans ragweed is not a major cause of pollinosis, even if *Ambrosia* pollen allergy is increasing in northern part of Italy and in central Europe.²⁰

TREES

In the Mediterranean regions the most potent allergenic tree pollen grains are produced by olive (*Olea europaea*) and cypress (*Cupressus*).

Oleaceae:

The Olive (*Olea europaea*) is a long-lived tree which has been grown by man for more than 5000 years for its fruit, oil and wood.²¹ It probably originated in Asia minor and then spread across the whole Mediterranean basin.^{10,21} There are various arboreal forms that vary according to the country in which they grow; for instance, in Spain there are now about 10 varieties and more are to be found in Italy. Still, it is not clear whether all these varieties of Olive trees are able to produce different allergens.

In Spain, southern Italy and Greece, olive pollen is one of the most common causes of pollinosis.^{1,7,9,10,22} Olive pollinosis is clinically characterized by oculorhinitis and/or bronchial asthma, with a higher prevalence of rhinoconjunctival symptomatology. Moreover, polysensitization to olive pollen in association with other allergens is more frequent than monosensitization. Some subjects with monosensitization to olive are affected by year-long symptoms that usually do not increase during the olive pollen season.

Cupressaceae

In the Mediterranean area, particularly Italy, France and Israel allergy to pollen allergens of *Cupressaceae* has been increasing in the last two decades.^{23,24} In some other regions, where *Cupressaceae* are present, sensitization to pollen allergens of these trees is probably underestimated. *Uppressus sempervirens* and *Cupressus arizonica* are the most common species within the genus *Cupressus*. *Juniperus* and *Thuja* are other genera of the *Cupressaceae* family.

The increased prevalence of allergic sensitization to *Cupressaceae* is probably due to the fact that these plants are widely used for gardening and reforestation. Exposure to cypress pollen in atopic patients seems to be a strong risk factor for allergic rhino-conjunctivitis and, in some cases, for bronchial asthma. Because cypress pollen occurs in the atmosphere in late winter, symptoms of cypress-pollen allergy could be mistaken for viral infections.

Minor allergenic pollens in the Mediterranean area are *Platanus*, *Hazel*, *Plantago*, *Rumex* and *Chenopodiaceae*.

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