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AND AAIITO STUDY GROUP ON POLLEN ALLERGY

Parietaria pollination duration: myth or fact?

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KEY WORDS

Parietaria; pollen; pollen count; Italy

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Summary

Background. Even though the *Parietaria* pollen season may be rather long, it is commonly thought that *Parietaria* pollen is a perennial allergen present along the whole year. **Objective.** This study aimed at investigating the duration of *Parietaria* pollen season during a 10-year period in Italy, analysing also the annual pollen quantity and the differences among geographical areas. **Methods.** Pollen count was assessed daily for 10 years. Globally, ten Italian centers measured *Parietaria* pollen count. Start date, peak date, end date, duration (days), peak value, and seasonal pollen index were evaluated in each center. **Results.** Ten-year *Parietaria* pollen count demonstrates that the pollen season usually lasted for 6-7 months in Italy. There are important differences among centres, mainly attributable to geoclimatic factors. **Conclusion.** This study demonstrates that *Parietaria* pollen season lasts about 6-7 months with two peaks (mainly in spring and lower in autumn) in Italy with important geographical variations. This information may have clinical relevance in managing patients allergic to *Parietaria*.

Introduction

Allergic rhinitis (AR) is characterized by an IgE-mediated inflammation. Pollens are the most common allergenic sources causing AR. Each pollen type has a specific pollination season and biological properties, mainly concerning its pro-inflammatory activity (1). In addition, it has been demonstrated that allergic inflammation and symptom occurrence are closely related to the duration of pollen exposure (2), thus giving to each specific pollen allergy peculiar clinical characteristics.

Parietaria is a widespread weed in the Mediterranean area, and many people are allergic to it (3). *Parietaria* belongs to the *Urticaceae* family; although many species exist, the most relevant are *Parietaria officinalis* and *judaica* concerning the AR pathogenesis. The term “*parietaria*” derives from the Latin word *paries* (wall), as it easily grows in the shade of old walls.

The pollen is small, the mean diameter of pollen grain of *Parietaria* is more about microns (more than PM10), and as consequence only a few grains can penetrate in trachea but they absolutely aren't able to reach terminal bronchioles. As a consequence, the high frequency of asthma is induced by bronchial

inflammation deriving from inflammatory events occurring in upper airways and other immunological mechanisms (probably also paucimicronic particles carrying allergens. Indeed, patients allergic to *Parietaria* frequently suffer also from asthma (4).

The *Parietaria* pollination season may be rather long, so that there is the popular belief that the symptoms for *Parietaria* allergy may be present actually along the whole year. This thought may have a practical implication also about allergen immunotherapy (AIT) prescription. In fact, many doctors prefer to prescribe AIT in *Parietaria* allergic patients using continuous courses, while they usually prescribe pre-co-seasonal AIT course for allergies to other pollens.

Though depending on climatic factors, the real duration of *Parietaria* pollen season is never perennial. Actually, *Parietaria* pollen season usually has two peaks: the main peak during spring and the second during early autumn. In autumn, there is a low peak in comparison to the very high spring concentration.

In this regard, two studies were recently published. The first study demonstrated that nasal allergic inflammation is closely associated with the duration of *Parietaria* pollen season, that lasted about 6 months in Bari, South of Italy (5). The second one confirmed the 6-months duration of *Parietaria* pollen season in Genoa and showed that a single pre-co-seasonal SLIT *Parietaria* course could be sufficient to reduce symptom severity and medication use (6).

As the previous studies were conducted in two defined geographical areas, the present study aimed to investigate the *Parietaria* pollination duration and quantity over a 10-year period in ten Italian centres located along the Italian peninsula.

Materials and Methods

We retrospectively analyzed the data concerning ten Italian centres: Bologna, Bordighera, Busto Arsizio, Caltanissetta, Città di Castello, Faenza, Genoa, Naples, Novi Ligure, and Verona (**figure 1**). The data concern a 10-year period (2004-2013).

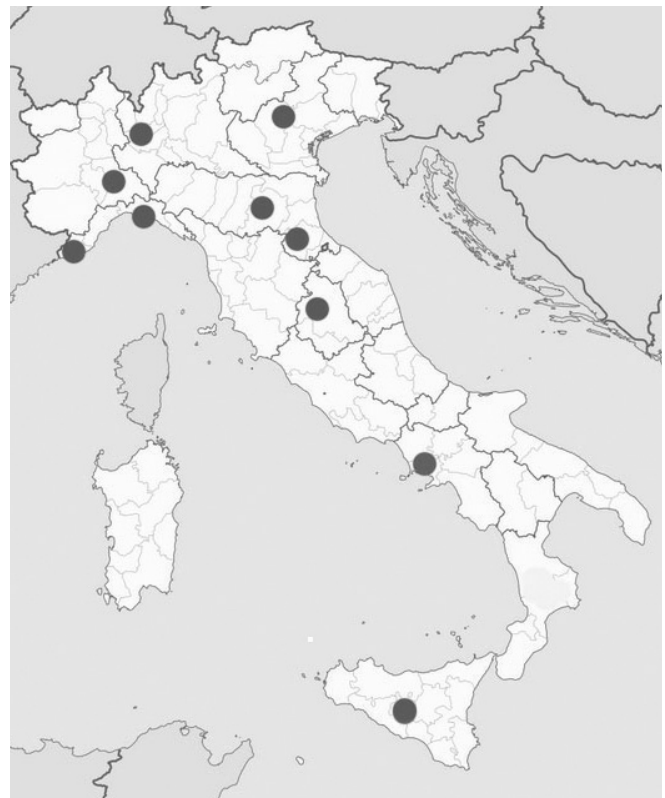
The *Parietaria* pollens were assessed and analyzed according to validated methods (7-11). The pollen counts were recorded by a Hirst pollen trap (VPPS 2000, Lanzoni Srl, Bologna, Italy). The Hirst pollen trap was specifically designed for sampling pollen and fungus spores. Flow rate is fixed and provided by an external vacuum pump. The orifice of the spore trap (2-14 mm) was set 0.5 mm from the trapping surface (sticky tape). The airflow was 10 L/min, and the speed of the trapping surface was 2 mm/h. The apparatus always remained in the same place, 20 m above ground level and far from any pollution source, and it was permanently exposed to wind by means of a rotating air vane. The Hirst-type sample provides daily pollen trapping on sticky tape, which is transferred to microscope slides. Each slide is stained with fuchsin, and is read using an optical microscope at 250 magnification.

The reading of the slide takes place in a qualitative manner, defining the individual particles, and quantitative, by reading five longitudinal bands, using a statistical method. Data are expressed as average daily concentration considering the day from 0 to 24 (n/m³). The pollen count values, relative to the scanned surface, are extrapolated to the entire surface of sampling.

We considered the following parameters: Timing of pollen season, by investigating Start dates, Peak dates, End dates (these data were converted to the day of the year from 1 January), Duration of pollen seasons (days), Peak value (the highest daily pollen concentration, grain/m³), Intensity of pollen season (total amount of pollen during) by describing the seasonal pollen index (SPI). The period from which the sum of daily mean pollen concentrations reaches 1% of the total sum corresponds to start of pollen season, the time when the sum reaches 99% of the whole pollen amount corresponds to the end of pollen season (11).

The data were expressed as the mean of 10 consecutive years: from 2004 to 2013, considering all centers. Data analysis was performed with the GraphPad software package analysis (GraphPad Prism Software Inc, San Diego, USA).

Figure 1 - Map of Italy with the centers that participated in the study.



Results

Globally, there was a relevant difference among centers on the considered parameters. The Bordighera center shows the most precocious start and the latest end of pollen season, hence the longest duration (**table 1** and **figure 2**). *Parietaria* pollen season starts at the end of February and ends at the end of October. We considered the cut-off of 20 pollens/mc as the concentration able to induce symptoms in *Parietaria* allergic subjects (12). In Northern Italy, namely in Bologna, Bordighera, Busto Ar-

sizio, Faenza, Genoa, Novi Ligure, and Verona, *Parietaria* season started at early April and ended in August, with two evident peaks: the most relevant in spring and the other during late summer. In Central Italy (Città di Castello), the *Parietaria* season started in early April and ended at the end of October, with a peak in May-June and another in September. In Southern Italy (Caltanissetta and Naples), the *Parietaria* season started in February and ended in August-September, with a peak between April and May.

Table 1 - Considered *Parietaria* parameters for ten Italian centers.

Center	Descriptive statistic	Start date	Peak date	End date	Duration (days)	Peak value (P/m ³)	SPI (pollen)
Bologna	Max	127	175	295	191	244	10423
	Min	106	105	284	157	71	5264
	Mean	104	142	290	181	172	7115
Bordighera	Max	47	145	351	320	1050	16283
	Min	17	90	325	290	222	13677
	Mean	31	106	337	308	507	14980
Busto Arsizio	Max	122	153	318	286	880	25304
	Min	32	92	278	157	121	8263
	Mean	88	119	293	205	405	16724
Naples	Max	63	108	294	287	297	10199
	Min	15	92	231	189	63	2330
	Mean	41	104	272	231	142	6952
Caltanissetta	Max	50	144	333	289	890	20740
	Min	21	91	282	232	255	7209
	Mean	41	111	305	264	551	12697
Città di Castello	Max	118	127	350	200	1200	16338
	Min	31	56	260	142	245	8801
	Mean	87	101	288	170	478	12877
Faenza	Max	128	96	310	202	161	10282
	Min	89	49	279	151	106	5457
	Mean	108	75	295	175	134	7787
Genoa	Max	106	317	355	340	1050	6370
	Min	15	89	285	178	91	2701
	Mean	72	150	307	235	291	4305
Novi Ligure	Max	121	181	301	195	222	17234
	Min	106	138	290	160	97	6762
	Mean	113	160	295	182	190	12540
Verona	Max	104	206	350	280	1729	22213
	Min	70	87	265	165	208	12016
	Mean	89	114	294	205	1047	16925

Figure 2 - *Parietaria* pollen count: start date, end date and duration of pollen seasons during the 2004-2013 period in Italy, in the nine centers considered.

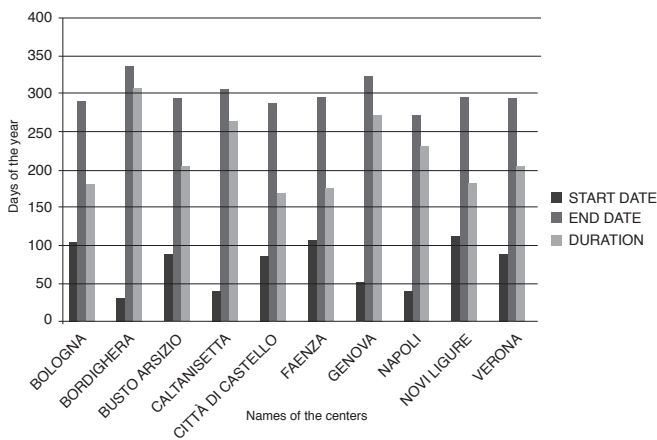


Figure 4 - *Parietaria* pollen count: total amount of pollen during pollen season (seasonal pollen index: SPI) during the 2004-2013 period in Italy, in the nine centers considered.

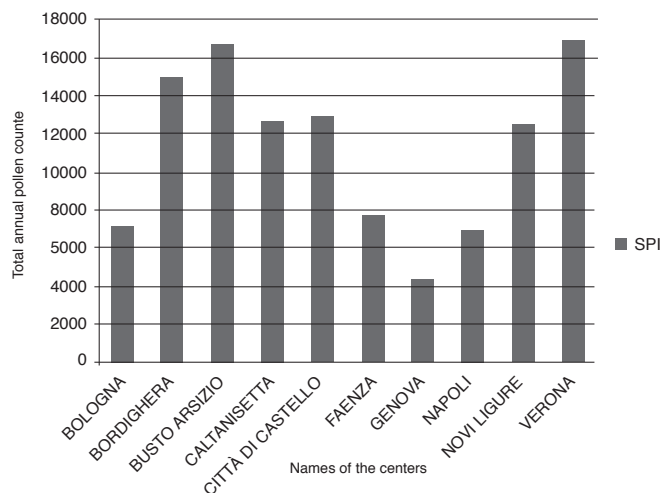
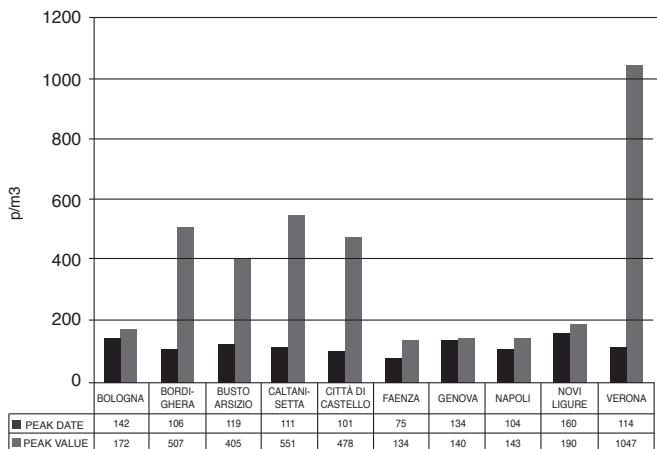


Figure 3 - *Parietaria* pollen count: peak date and peak value, during the 2004-2013 period in Italy, in the nine centers considered.



Discussion

Pollen allergy, such as hay fever, is the most common allergic disorder, as it affects up to 25% of general population (3). In this regard, *Parietaria* allergy is very frequent mainly in the Mediterranean area, as about fifty per cent of allergic patients are sensitized to it (13).

Many physicians believe that *Parietaria* pollen season may hold nearly over the whole year; this conviction may have a consequence in the clinical practice, for example on the schedule of Allergen Immunotherapy (AIT).

Previously, it has been reported that allergic inflammation and symptoms are closely related to *Parietaria* season's duration, which lasted about 6 months, in two different Italian geographic areas, such as in Liguria and Apulia (5,6). Moreover, a recent study over a 30-year period demonstrated that *Parietaria* pollen concentration tended to increase over time. This fact may explain the consistent increase in patients sensitized to *Parietaria*.

The present study addressed the assessment of the real duration of *Parietaria* pollen season in Italy, considering a 10-year observation period. The findings show that *Parietaria* pollination lasts 6-7 months on average with two main peaks: the most important during mid-spring and a lower peak during early fall, but with remarkable differences among geographic areas. The differences are obviously dependent on the climate characteristics of each region.

The present outcomes are substantially consistent with previous surveys. A 5-year aerobiological study, conducted in 1984-1988, evidenced that *Parietaria* allergy is a relevant issue in Italy, differing from most of European countries (14). Another study demonstrated that *Parietaria* season trended to prolong and its pollen count trended to increase over time (15).

The main limitations of this study is that it was conducted only on aerobiological data without clinical parameters, and that the considered period was relatively short. On the other hand, the strength of this study is the relevance of well-balanced distribution of participant centres.

Conclusions

This study demonstrates that *Parietaria* pollen season lasts about 6-7 months in Italy, with important geographical variations. This information has clinical relevance in managing patients allergic to *Parietaria*.

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