



TPS31

Grass Pollen Potency In Ambient Aerosol; Grass Pollen Counts; Seasonal Allergic Rhinitis; Meteorological Factors And Pollutants In Madrid, Spain, During 2009 And 2010.

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Aim:

The aim of this study was to compare the specific quantification of Phl p 1 and Phl p 5 aeroallergens and their potency, to Poaceae pollen counts and their potency, so as to establish their association with meteorological factors, pollutants and symptoms in patients with seasonal allergic rhinitis.

Methods

The Hirst method sampler and the Burkard Cyclone sampler were used for pollen count and allergen quantification, respectively. The aerosol was extracted and quantified for Phl p 1 and Phl p 5 content using enzyme-linked immunosorbent assay procedures (the potency was defined as allergen per daily grass pollen count). The sampling period ran from 23rd March 2009 to 27th July 2010. An electronic card was used on a daily basis by 23 patients with relevant clinical sensitization to grass pollens during the last two years (score: 0 - absence of symptoms; 1- mild symptoms; 2- moderate symptoms; and ≥ 3 -severe symptoms). Descriptive statistics of the same variables in 2009 and 2010, study periods, and non-parametric paired samples (Wilcoxon test -SPSS24 package) were used as variables that did not fit normal distribution, to allow any significant differences to be seen at the two observation points for each variable studied. A categorical principal component analysis model (CatPCA - SPSS24 package) was also carried out.

Results:

The presence of atmospheric Phl p 1 and Phl p 5, is mainly confined to the period when grass pollen grains are present. Good correlation between grass pollen grains and Phl p 1 and Phl p 5 levels ($r_s=0.63$ and 0.70 respectively, $p < 0.05$) throughout the study period. The main allergenic activity during 2009 was detected on 19th May (pollen count: 73 grains/m³/d; Phl p 1: 15,790 pg/m³/d and Phl p 5: 240 pg/m³/d). During 2010, the principal allergenic activity was detected on 24th May (pollen count: 324 grains/m³/d, Phl p 1: 38,991 pg/m³/d and Phl p 5: 1,562 pg/m³/d). Daily rhinitis symptoms correlated with a similar significance for both pollen grains, Phl p 1 and Phl p 5 ($r_s = 0.64$; $r_s = 0.42$; $r_s = 0.46$; $p < 0.05$). The strongest relationships during the period studied using the CatPCA analysis, were between seasonal allergic rhinitis and grass pollen counts ($R = 0.508$), temperature and O₃ ($R = 0.522$). The pollen potency (Phl p 5/grass pollen grains), was higher at the beginning of the 2010 grass season. The mean symptom score value in 2009 was 1.34 and in 2010, 0.92. Despite higher pollen grain counts in 2010, the higher symptom score in 2009 could be explained by the higher allergen potency observed in 2009 vs 2010 in Phl p 1 (70.03 pg/pollen vs 47.80 pg/pollen, $p = 0.025$). The CatPCA analysis explains around 45.39 % of the variance. During the period studied, the strongest relationships were between symptoms and grass pollen counts ($R = 0.508$), and temperature and O₃ ($R = 0.522$).

Conclusion

The presence of atmospheric Phl p 1 and Phl p 5 was mainly confined to the period of presence of grass pollen grains. A close correlation was found between grass pollen counts, Phl p 1, Phl p 5, and daily symptoms. Daily symptoms did not correlate better with Phl p 1 and Phl p 5, than with pollen counts. Pollen potency was variable along the seasons. The higher pollen potency in 2009, together with the effects of temperature and pollution (mainly O₃), could contribute to the higher seasonal allergic rhinitis symptom score observed in 2009.

In relation to this presentation, I declare that there are no conflicts of interest.

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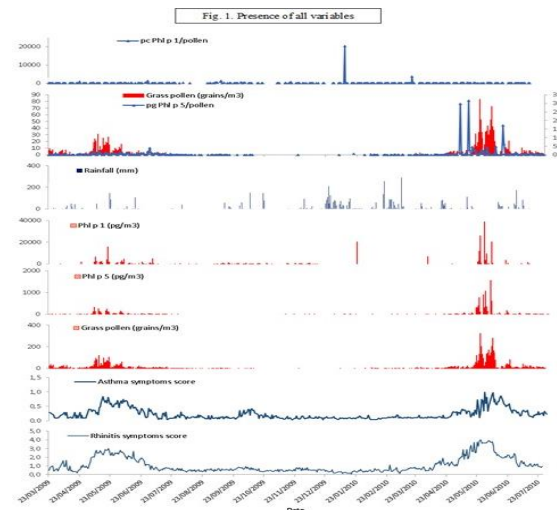


Fig. 1. Presence of all variables: a) Pollen flight mainly during 3-kyred June in 2009 and 2010, with concomitant Phl p 1 and Phl p 5 presence in the air. Both, pollen and allergens, were greater in 2010. b) Daily symptoms correlated equally closely with pollen counts and allergen measurements. c) Phl p 5 allergens were observed in small concentrations, during numerous days from September to November years on the contrary no pollen grains were observed. Daily allergen released per pollen (pollen potency) was higher at the beginning of 2010 season.

Table 1. Descriptive study of the variables. Data from 23/3 to 27/7 2009 and 2010.

	N	Mean	SD	Minimum	Maximum
*Rhinitis symptoms_2009 (score)	127	3.44	1.25	1.22	6.61
Grass pollen counts_2009 (grains/m ³)	127	18.008	21.27	0.00	121.55
Phl p 5_2009 (pg/m ³)	85	33.15	61.58	0.00	303.96
Phl p 1_2009 (pg/m ³)	85	827.70	2,049.82	0.00	15,791.67
SO ₂ _2009 (µg/m ³)	127	9.45	3.21	6.00	20.00
CO_2009 (µg/m ³)	127	0.37	0.07	0.24	0.63
NO ₂ _2009 (µg/m ³)	127	50.67	12.10	23.00	87.00
PM10_2009 (µg/m ³)	62	32.68	10.53	1.50	60.00
O ₃ _2009 (µg/m ³)	127	30.87	11.43	2.00	82.00
Benzene_2009 (µg/m ³)	127	0.33	0.21	0.18	1.30
Temperature_2009 (°C)	127	19.4	6.4	7.2	29.8
Humidity_2009 (%)	127	26.05	13.07	8.00	78.00
Rainfall_2009 (L/m ²)	127	4.36	19.37	0.00	147.00
Wind speed_2009 (m/s)	127	16.26	7.30	4.00	33.00
Winddir_2009 (°)	127	20.34	7.80	2.00	36.00
*Rhinitis symptoms_2010 (score)	126	1.56	1.11	0.00	4.80
Grass pollen counts_2010 (grains/m ³)	127	31.79	56.20	0.00	324.00
Phl p 5_2010 (pg/m ³)	84	94.14	252.72	0.00	15,627.3
Phl p 1_2010 (pg/m ³)	84	1,565.21	5,735.13	0.00	38,991.67
SO ₂ _2010 (µg/m ³)	127	8.99	3.23	4.00	14.00
CO_2010 (µg/m ³)	127	0.36	0.05	0.23	0.54
NO ₂ _2010 (µg/m ³)	127	46.51	17.70	19.00	101.00
PM10_2010 (µg/m ³)	84	28.08	9.29	3.00	59.00
O ₃ _2010 (µg/m ³)	127	34.20	13.00	27.00	88.00
Benzene_2010 (µg/m ³)	127	0.63	0.21	0.25	1.18
Temperature_2010 (°C)	127	18.5	6.2	8.0	28.7
Humidity_2010 (%)	127	35.60	17.07	11.00	88.00
Rainfall_2010 (L/m ²)	127	9.29	24.49	0.00	174.00
WindSpeed_2010 (m/s)	127	13.87	8.02	2.00	49.00
Winddir_2010 (°)	127	19.54	8.98	1.00	36.00

Table 2. Descriptive of potency* (pg/pollen).

	N	Mean	SD	Minimum	Maximum	Median
Potency_Phl p 5_2009	78	0.89	1.50	0.00	10.01	0.24
Potency_Phl p 1_2009	82	70.03	175.24	0.00	1,116.67	0.00
Potency_Phl p 5_2010	74	0.57	1.11	0.00	7.72	0.08
Potency_Phl p 1_2010	86	47.80	375.34	0.00	3,475.00	0.00

*Pollen potency was obtained dividing Phl p 1 or Phl p 5, between the number of pollen grains of grasses, obtained the pollen sampler.

Fig. 2. CatPCA Analysis 2009-2010.

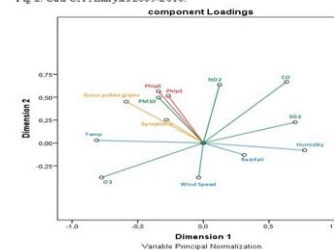


Table 3. Symptoms correlations: 23 March -27 July in 2009 and 2010.

Symptoms	r	p	N	Rhinitis Symptoms 2010	r	p	N
Symptoms	1.000		127	Symptoms	1.000		126
Grass pollen counts	.645**	0.000	127	Grass pollen counts	.220*	0.013	126
Phl p 5	.466**	0.000	85	Phl p 5	.219*	0.046	83
Phl p 1	.422**	0.000	85	Phl p 1	.420**	0.000	83
SO ₂	.309**	0.000	127	SO ₂	.546**	0.000	126
CO	0.115	0.197	127	CO	0.030	0.581	126
NO ₂	-0.056	0.534	127	NO ₂	-.539**	0.000	126
PM10	-0.197*	0.124	62	PM10	-.256**	0.020	83
O ₃	0.128	0.152	127	O ₃	-.245**	0.006	126
Benzene	0.139	0.119	127	Benzene	-0.069	0.441	126
Temperature	-.291**	0.001	127	Temperature	-.501**	0.000	126
Humidity	.198*	0.026	127	Humidity	.468**	0.000	126
Rainfall	0.095	0.287	127	Rainfall	-0.025	0.777	126
Wind Speed	-.228**	0.010	127	Wind Speed	0.062	0.488	126
Wind Direction	-.293**	0.001	127	Wind Direction	-0.045	0.615	126
Potency_Phl p 5	0.155	0.165	82	Potency_Phl p 5	0.205	0.076	76
Potency_Phl p 1	.248*	0.025	82	Potency_Phl p 1	.416**	0.000	76

Fig. 2 Two-dimensional CatPCA plot based on 13 quantitative variables studied.

Table 3. Symptoms correlations: 23 March -27 July in 2009 and 2010.

Table 4. Nonparametric paired contrast of Wilcoxon 2010 Vs 2009.

Test statistics (z, c)	Z	Sig. Asymptotic (bilateral)	Sig. Monte Carlo (bilateral)	Confidence Interval 99%
				Lower Limit Upper Limit
Rhinitis Symptoms 2010 - 2009	-9.714*	0.000	0.000	0.000 0.000
Grass pollen counts 2010 - 2009	-1.601*	0.109	0.112	0.104 0.121
Phl p 5_2010 - 2009	-.773*	0.440	0.442	0.429 0.455
Phl p 1_2010 - 2009	-2.300*	0.021	0.018	0.013 0.021
SO ₂ _2010 - 2009	-.568*	0.000	0.000	0.000 0.000
CO_2010 - 2009	-.535**	0.579	0.576	0.563 0.589
NO ₂ _2010 - 2009	-2.308*	0.021	0.021	0.018 0.025
PM10_2010 - 2009	-2.568*	0.010	0.008	0.006 0.011
O ₃ _2010 - 2009	-.452*	0.014	0.016	0.012 0.019
Benzene_2010 - 2009	-.804*	0.000	0.000	0.000 0.000
Temperature_2010 - 2009	-1.642*	0.101	0.101	0.094 0.109
Humidity_2010 - 2009	-6.620*	0.000	0.000	0.000 0.000
Rainfall_2010 - 2009	-.314*	0.021	0.018	0.014 0.021
Wind speed_2010 - 2009	-.2.873*	0.004	0.004	0.002 0.005
Wind Direction_2010 - 2009	-.847**	0.397	0.395	0.383 0.408
Potency_Phl p 5_2010 - 2009	-.360*	0.719	0.720	0.708 0.731
Potency_Phl p 1_2010 - 2009	-.2.210*	0.027	0.025	0.021 0.029

Table 4. Nonparametric paired contrast of Wilcoxon 2010 Vs 2009.

* Significant differences: p-Value = 0.000. nonparametric paired contrast of Wilcoxon