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## Is Environmental Pollen Concentration a Risk Factor for SARS-CoV-2 Infection?

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Moral de Gregorio AJ<sup>1\*</sup>, Guzmán Rodríguez R<sup>1\*</sup>, Senent Sánchez CJ<sup>1</sup>, Lemus Calderón JA<sup>1</sup>, Valero Santiago A<sup>2</sup>

<sup>1</sup>Allergology Department, Virgen del Valle Hospital, Toledo, Spain

<sup>2</sup>Department of Pneumology and Allergy, Hospital Clinic, Institut d'Investigacions Biomèdiques August Pi i Sunyer (IDIBAPS), Barcelona, Spain

\*Both authors contributed equally.

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### To the Editor:

Since the new betacoronavirus SARS-CoV-2 [1] emerged in Wuhan, People's Republic of China, in late 2019 and the World Health Organization declared COVID-19 a pandemic on March 11, 2020, the number of cases increased progressively, reaching 153 632 235 million infected and 3 215 270 million dead as at April 30, 2021 [2].

In this context, various publications have linked the SARS-CoV-2 infection rate to the pollen concentration in a specific area, the most recent being that of Damialis et al [3], who reported data on 31 countries around the world. This theory is supported by studies indicating that pollens, regardless of their allergenic potential, possess the ability to suppress antiviral immunity by weakening the immune system's response to respiratory viruses [4]. At cellular level, the eosinophil, especially in eosinopenia, has been reported to be a relevant factor in COVID-19, although further studies are needed to confirm and clarify its role in this emerging disease [5].

Other articles have also appeared. Hoogeveen et al [6] concluded that pollen is an inverse predictor of respiratory infections, including COVID-19.

In our opinion, the statement made by Damialis et al [3] at a global level does not bear any relation to what we have observed in Spain, since, as COVID-19 occurs in waves, a period of pollination may coincide at some point with a certain increase in cases. Therefore, we believe that chance plays a greater role in this relationship than increased pollen concentrations in the environment. In addition, Damialis et al only assess 1 month of pollination, thus potentially inviting bias. Data from a whole year would make for a more interesting assessment.

For this reason, we proposed a retrospective longitudinal study to interpret the relationship between daily cases of SARS-CoV-2 infection and the total daily pollen concentration in Spain. To this end, we collected the total daily pollen concentration and the daily incidence of COVID-19 cases in 14 Spanish cities (Madrid, Barcelona, Valencia, Sevilla, La Coruña, Oviedo, Burgos, San Sebastian, Logroño, Zaragoza, Pamplona, Murcia, Toledo, and Cáceres) from March 1, 2020 to February 28, 2021. We chose these cities to ensure a heterogeneous sample of the Spanish population; the dates chosen cover the first year of the pandemic in Spain.

Pollen data were collected from the website [www.polenes.com](http://www.polenes.com) of the Aerobiology Network of the Spanish Society of Allergology and Clinical Immunology (SEAIC); the data on infections per city per day were obtained from the website of the Spanish Ministry of Health, Consumption, and Social Welfare.

Once these data were available, a Spearman correlation was performed to determine whether there was a significant relationship between total pollen concentrations and cases of SARS-CoV-2 infection.

Comparison of the daily cases of COVID-19 with the daily pollen concentration in the cities analyzed yielded a negative correlation coefficient, thus ruling out a significant relationship. Furthermore, the statistical analysis revealed no significant relationship between the daily cases of COVID-19 and the total daily pollen concentration ( $P < .01$ ).

As an example, the highest pollen count in Toledo was recorded on May 24, 2020, whereas the peak of COVID-19 cases was on January 20, 2021. Similar examples can be seen in Table 1 (Supplementary Material), which shows the absence of a relationship between the peak pollen day and the peak COVID-19 day in the cities studied and between the total pollen concentrations and the total numbers of COVID-19 cases. Figure 1 (Supplementary Material) shows the relationship between daily COVID-19 cases and total pollen concentrations in the city of Toledo during the year studied.

In conclusion, in the 14 Spanish cities analyzed, the daily number of cases of SARS-CoV-2 infection is not significantly related to the total daily pollen concentration in the environment. Therefore, we can state that, in Spain, there is currently no association between total pollen concentration and cases of COVID-19, regardless of whether the pollens are allergenic.

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### Conflicts of Interest

The authors declare that they have no conflicts of interest.

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### ■ Angel Javier Moral de Gregorio

Servicio de Alergología.  
Hospital Virgen del Valle, Complejo Hospitalario  
Universitario de Toledo  
Ctra. de Cobisa, s/n  
45071 Toledo, Spain  
E-mail: amoralgregorio@gmail.com