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EAACI TASK FORCE REPORT

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The development of birch pollen seasons over 30 years in Munich, Germany—An EAACI Task Force report*

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To the Editor

The global warming–oriented climate change is able to induce changes in the presentation of allergic disorders[1] due to (a) increase in the annual sum of some important airborne allergenic pollen,[2] (b) increase in the pollen allergenic potency,[3] and (c) earlier shifts in airborne tree and grass pollen of breathed air in Europe, as documented in aerobiological studies.[4] Studies on the period of times with pollen flight do not necessarily correlate directly with symptom burden of hay fever sufferers as long they have not included symptom data from subjects with allergic rhinitis or rhinoconjunctivitis. This shortcoming was taken into account when the new EAACI pollen season definition was developed and published to describe the period of time in which pollen allergy sufferers develop their allergic symptoms.[5]

The definition has been shown to be robust[6] and, even more importantly, reflects the onset and end of symptoms due to airborne birch and grass pollen.[7,8] Hence, using the EAACI definition of pollen season we are now able to better understand changes in the time periods during which hay fever subjects suffer.

In this communication, we report that the EAACI definitions are an appropriate tool for the demonstration of a change in periods of the birch pollen season in Munich, Germany.

The German Pollen Information Service Foundation (www.pollenstiftung.de) has quantified airborne pollen in Munich since 1988 using a Hirst-type volumetric spore trap.

The data from the pollen trap in Munich from 1988 until 2018, except for 1995, were used to calculate[9] the time of onset and end of birch pollen season over the 30-year period, including the peak pollen days and the total annual sum of birch pollen.

In order to identify trends of the studied pollen season (PS) characteristics, we fitted a linear regression model for each of them and evaluated the statistical significance using a *t* test for the hypothesis that there is no association between the identified trend and our PS indicators.

The optimal slope and intersection (coefficients) were calculated by minimalizing the sum of squared errors (SSE) between the curve and the data points. We calculated the *P*-value for each plot and used $P < .05$ as the cutoff for the significance level. Furthermore,

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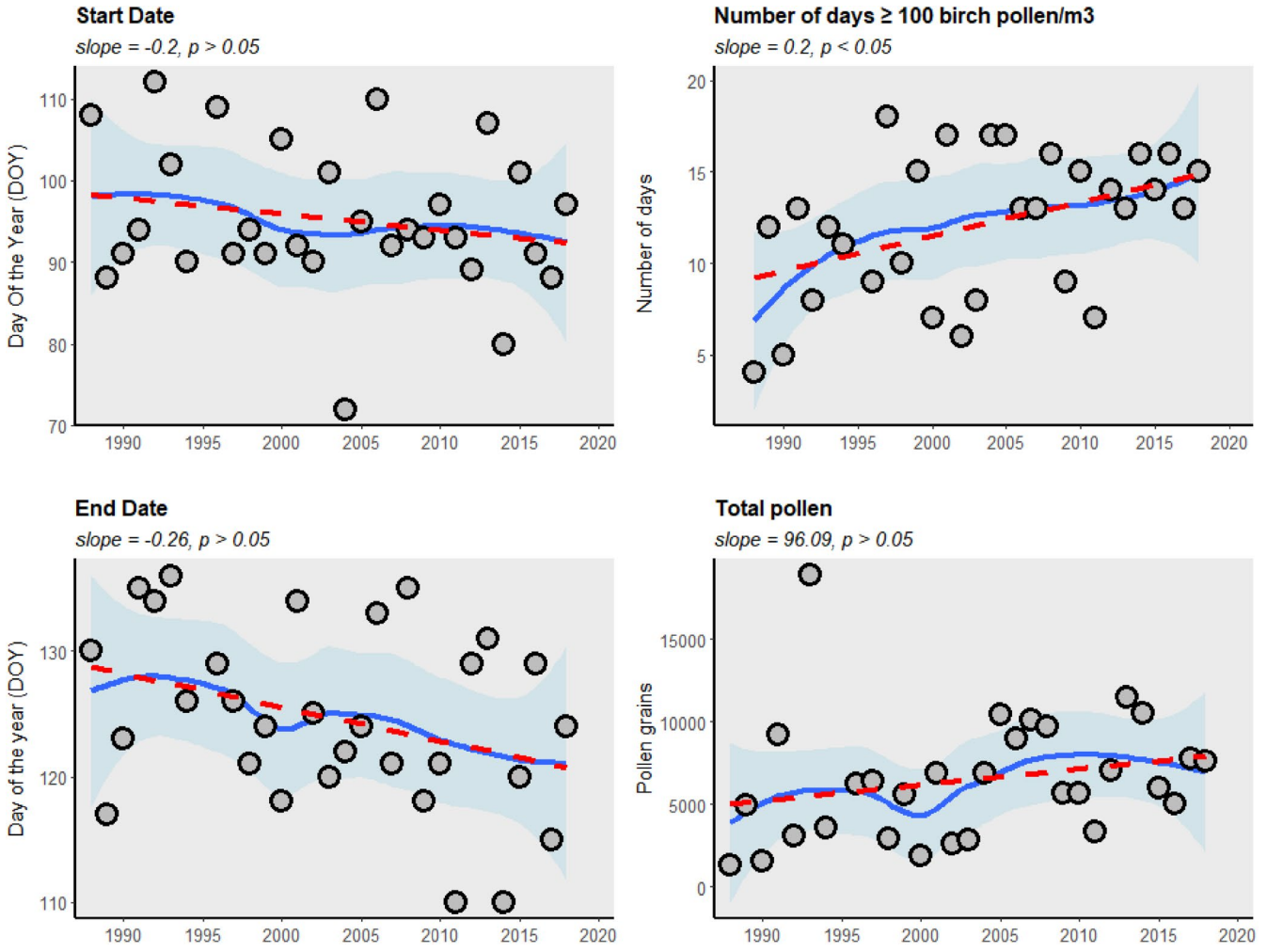

FIGURE 1 Overview on the start and end of birch pollen season, the number of days ≥100 birch pollen/m^3 and the total pollen (annual sum) measured at the pollen station Frauenlobstrasse 9-11 in 80337 Munich, Germany from 1988 till 2018, except of 1995. For every plot, the slope of the fitted regression line indicating a (linear) trend, and the statistical significance of the trend (in terms of *P*-value) is mentioned. The number of days ≥100 birch pollen/m^3 has a statistically significant trend of increase during the studied period. Dashed red line represents the linear regression line; blue line represents a least squares fit; thick light blue line represents the confidence interval for the aforementioned least squares fit

95% confidence intervals of the sample distribution were calculated for each of the pollen season.

The analysis using the EAACI definition showed a variable but suggestive trend toward an earlier start and end of birch pollen season, although statistically not significant. We estimated that the mean overall change in the PS start is equal to 6 days, while the change in the PS end is approx. 8 days, over the 30 years of study. The mean length of the PS was equal to 30 days, with a standard deviation equal to approx. 8 days, demonstrating a slight decreasing trend, reflecting a duration of the PS shorter by approx. 2 days in the 30 years of study (Figure 1).

Furthermore, the number of peak pollen days per year (number of days ≥100 birch pollen/m^3) was variable but increasingly more frequent (slope = 0.2, $P < .05$) in later years. The annual birch pollen count shows a slight increase over this period.

The knowledge of the earlier beginning of the birch pollen season and the onset of allergic symptoms can serve to adapt drug therapy and the start of allergen immunotherapy against birch pollen allergy.

In conclusion, using the harmonized and recently validated EAACI criteria for birch pollen season definition we demonstrated a tendency to an earlier start of the season over the last 30 years in Munich, Germany, and a statistically significant increase in the number of days with high pollen counts (≥100 birch pollen/m^3).

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CONFLICT OF INTEREST

No conflict of interest declared by KCB, KK, BW, MW, and TT Dr Pfaar reports grants and personal fees from ALK-Abelló, grants and personal fees from Allergopharma, grants and personal fees from Stallergenes Greer, grants and personal fees from HAL Allergy

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