



Letter

Variations in pollen counts between Indianapolis, IN, and Dayton, OH, in spring 2013 and 2014

Approximately 20% to 40% of the US population has allergic rhinitis. Because pollens contribute significantly to allergic rhinitis, monitoring local pollen counts can help patients and clinicians better manage this condition.¹ Identification of local pollens can help clinicians more accurately select allergens for testing and immunotherapy and improve advice to sensitized patients on environmental control measures.

Certified pollen counting stations can be found on the National Allergy Bureau (NAB) website. Currently, there are 82 NAB stations in the United States but none in Indiana. The closest station to Indianapolis listed on the NAB website is 120 miles east, in Dayton, OH.² Dayton and Indianapolis are considered to be in the Appalachian floristic province within the North Atlantic region. Pollen counts in cities in the same region are assumed to be similar.³ Prior work comparing pollen counts between cities 11 km apart found similarities in pollen counts.⁴ However, pollen counts can be affected by precipitation, temperature, wind, and other environmental factors.⁵

To determine whether pollen reports from 120 miles away correctly reflect local pollen activity, we compared differences in pollen species and pollen counts between Indianapolis and Dayton from April through June in 2013 and 2014. We chose the spring season because this timeframe is associated with peak public interest in pollen allergies.⁶

Pollen data for Indianapolis were collected from the semirural backyard of a pediatric allergist with a Rotorod sampler (model 40; Rotorod, IMS, Plymouth Meeting, Pennsylvania). The sampler was located on an unobstructed flat surface, 1 story above ground, as per the NAB and American Academy of Allergy, Asthma, and Immunology (AAAAI) guidelines.⁷ One allergist, who has studied pollen counting at the AAAAI and is eligible for the AAAAI aerobiology certification examination, counted and recorded all pollen data. Pollen counts were posted daily to his website.⁸ The Regional Air Pollution Control Agency collected and reported the data for Dayton to the NAB, using a Burkard sampler at the public library in downtown Dayton.² The laboratory technician performing the 2013 and 2014 pollen counts for Dayton was not NAB certified (A.R., personal e-mail communication, February 29, 2016). Both sites reported daily overall pollen count (grains per cubic meters of air) and counts for each tree, grass, and weed species collected. Meteorologic data were obtained from the website of the Midwestern Regional Climate Center from the University of Illinois.⁹ Analyses were performed using SAS statistical software, version 9.3 (SAS Institute Inc, Cary, North Carolina), with Wilcoxon nonparametric tests being used because of data skewness.

Pollen data for Dayton were available for 62 days for the periods in 2013 and 2014. Pollen data for Indianapolis were available for 84 days in 2013 and 89 days in 2014. Pollen counts were available for 20 to 22 days each month for Dayton. Tree, grass, and weed pollens were detected in Indianapolis and Dayton during this period in both 2013 and 2014 (Fig 1). In 2013, the daily median pollen count was significantly higher in Dayton (232.5 grains/m³ vs 154.5 grains/m³; $P = .02$). Dayton's daily median pollen count was higher in 2013 compared with 2014 (232.5 grains/m³ vs 123 grains/m³; $P = .02$).

Indianapolis had a higher total number of grass pollen days in 2013 (57/84 days [68%] vs 31/62 days [50%]; $P < .001$), with grass pollens present almost daily in May. In addition, Indianapolis had more days in June where weed pollens were identified (11/28 days vs 0/20 days; $P < .001$). In contrast, tree pollens were detected on significantly more days in Dayton in June (20/20 days vs 8/28 days; $P < .002$).

In 2014, weed pollens were identified more frequently in Indianapolis compared with Dayton (29/89 days [33%] vs 10/62 days [16%]; $P < .001$). In addition, during June in Indianapolis, grass and weed pollens were identified on most of the days sampled (29/30 days vs 14/21 days for grasses and 22/30 days vs 6/21 days for weeds; $P < .002$ for each pollen). In contrast, tree pollens were noted on significantly more in Dayton during June (21/21 days vs 13/30 days; $P < .04$). There were no significant differences in either city between 2013 and 2014 when comparing the number of days that tree, grass, or weed pollens were present.

Between the 2 years and the 2 cities, similarities and differences in the species were identified. Maple was the most common tree pollen identified in both cities. In Indianapolis, weed pollens, English plantain, and nettle were detected in June 2014, but only the former was present in June 2013.

To determine whether differences in the weather between the 2 cities contributed to the differences in pollen counts, we compared differences in mean rainfall, preceding winter temperatures and snowfall, and temperatures of the timeframes studied for both years. A significant difference did not exist between the 2 cities in 2013 or 2014.⁹

A few limitations to this study should be noted. Although weather and precipitation did not significantly vary between the 2 cities, these factors can contribute to differences noted in pollen counts. A prospective study comparing rain and weather patterns day by day and relating them to daily pollen counts is in process. Next, although the pollen counters used differed between the 2 areas, daily pollen counts have been positively correlated between Burkard and Rotorod counters for the most abundant pollens. The Rotorod and Burkard counters are equal in collecting particles greater than 10 μm , which were the particle sizes involved in this

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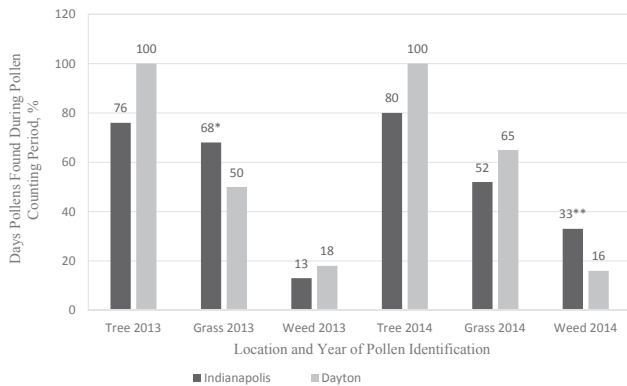


Figure 1. Pollen variability between Indianapolis, IN, and Dayton, OH, in spring 2013 and spring 2014. $n = 62$ days for 2013 and 2014 for Dayton, $n = 84$ days in 2013 for Indianapolis, and $n = 89$ days in 2014 for Indianapolis. * $P < .001$; ** $P < .001$.

study.^{10,11} Finally, nettle is a plant more commonly found in rural, marshy areas.¹² The semirural location of the Indianapolis pollen counter may have contributed to greater nettle identification than the urban location of the counter in Dayton.

In summary, pollen variety and activity differed between 2 cities, 120 miles apart, in the same floristic zone. Weed and grass pollens were found at different times in the 2 areas, suggesting that pollen differences at other times of the year should also be studied. A clinician in central Indiana using NAB data from Dayton may miss critical timing of therapy for nasal allergy and may not be able to match exposure to sensitization.

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