

Association Between Tree Pollen Counts and Asthma ER Visits in a High-Density Urban Center

Sunit P. Jariwala, MD

Division of Allergy & Immunology

Albert Einstein College of Medicine, Bronx, NY

Disclosures

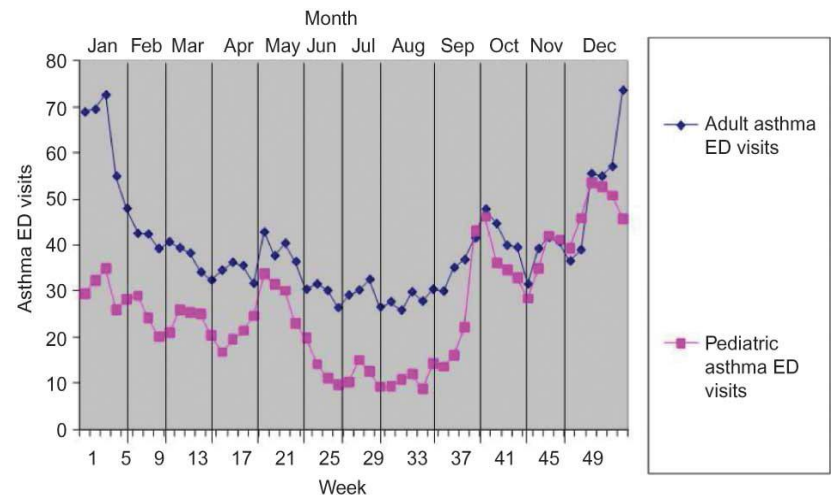
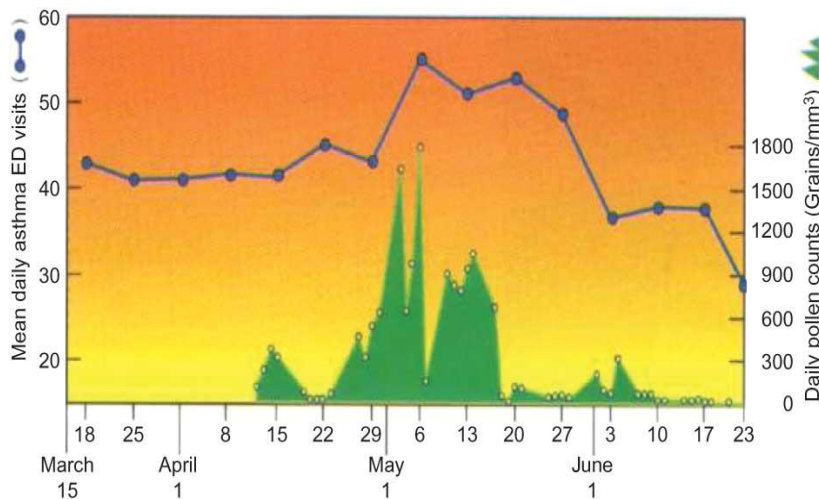
- Dr. Jariwala has no financial disclosures to report.

Background

- Asthma morbidity and mortality are very high among minority inner-city populations.
- The New York City borough of the Bronx, has high rates of asthma-related hospitalizations and mortality.
- The annual asthma-related hospitalization rate in the Bronx is 0.57% as compared to the U.S. rate of 0.14%.

High tree pollen counts correlated with a large increase in Asthma ED visits in 1999

- In a prior analysis of data from 1999, we found that a large spring increase in Asthma related ED visits (AREDV) closely correlated with high tree pollen counts.
- These findings were consistent among adult and pediatric AREDV, which showed similar patterns throughout the year.



Literature Review

- **Dales RE, Cakmak S, et al. JACI, Feb 2004 (Canada)**
 - Study investigated the association between daily changes in aeroallergens and daily changes in hospitalizations for asthma during a 7-year period between 1993 and 2000 in 10 of the largest cities in Canada.
 - Tree pollen was associated with 2.9% increase in asthma hospitalizations in Canada.
 - Fungal spores tended to have a greater influence on asthma-related hospitalizations than pollen counts.

Literature Review

- **Busse WW, Morgan WJ, et al. NEJM, 2011**
 - Administration of omalizumab was associated with decreased spring-related asthma exacerbations in inner-city children, adolescents and young adults.
 - Patient population selected due to the high asthma morbidity in inner-city children.
 - Data suggest that targeting an allergic component among inner-city asthmatics offered a benefit beyond conventional therapy.
 - Decreases in asthma exacerbations were seen in all levels of asthma severity.

Literature Review

- **Darrow LA, Hess J, et al. JACI, Sept 2012 (Atlanta, GA)**
 - Pollen independently contributed to asthma morbidity in Atlanta with a 10% to 15% increased risk of asthma-related ED visits on days with the highest pollen concentrations.
 - Observed a 2 to 3% increased risk of asthma-related ED visits per standard deviation increase in pollen (*Quercus* and *Poaceae* species) levels.
 - Association for *Quercus* species was strongest for children aged 5 to 17 years.

Literature Review

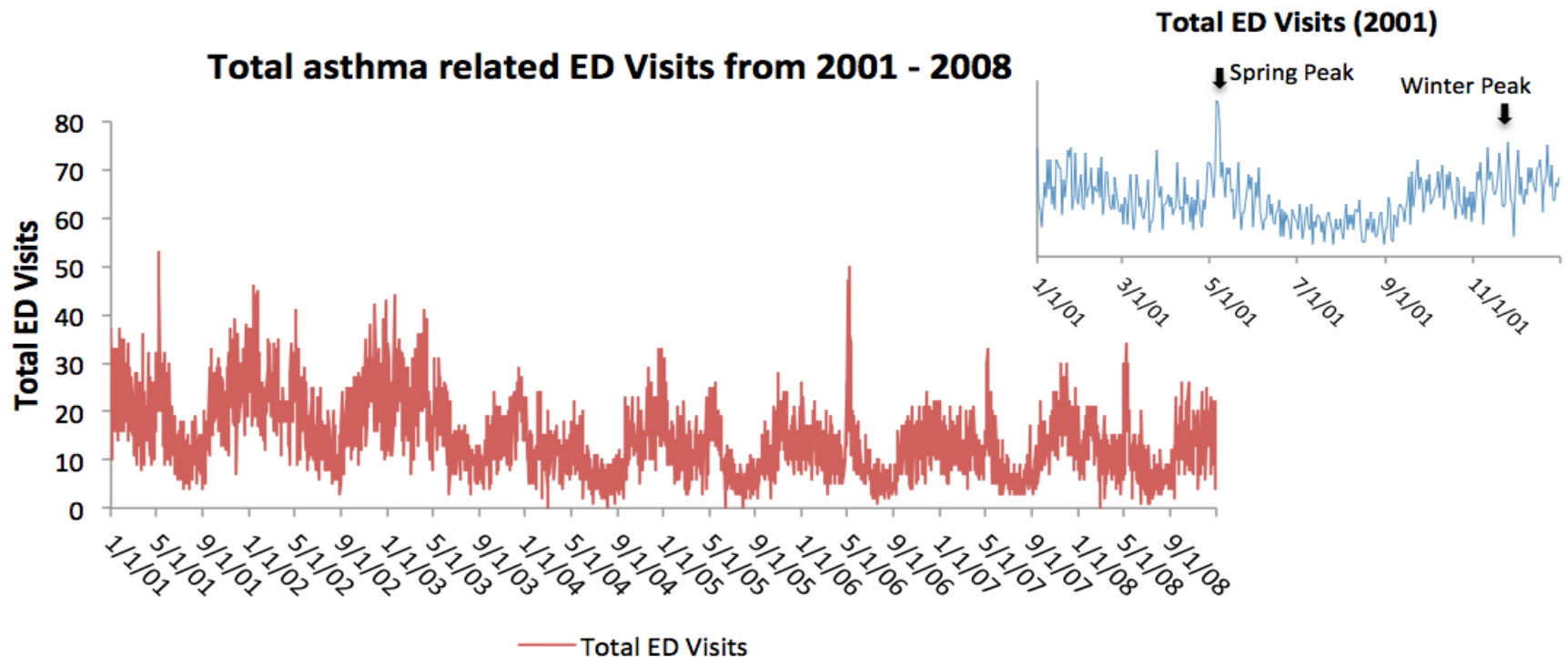
- **Sheffield PE, Weinberger KR, et al. ISRN Allergy, April 2011**
 - Peak of allergy medication sales in New York City occurs in late April to early May.
 - Spring medication peak coincides with peak concentrations of certain tree pollens including maple, birch, ash, and oak.

The association between asthma-related emergency department visits and pollen and mold spore concentrations in the Bronx, 2001-2008

- **Jariwala S, Toh J, et al. J Asthma. Nov 2013**
 - Daily adult and pediatric asthma-related emergency department visits (AREDV) and asthma-related hospitalizations (ARH) from 2001 - 2008 were obtained from two Bronx hospitals (Montefiore-Moses and Montefiore-Weiler).
 - Daily counts for tree, grass and weed pollen and mold spore counts from March 2001 to October 2008 were obtained from the Armonk counting station in Westchester County.

Key Findings

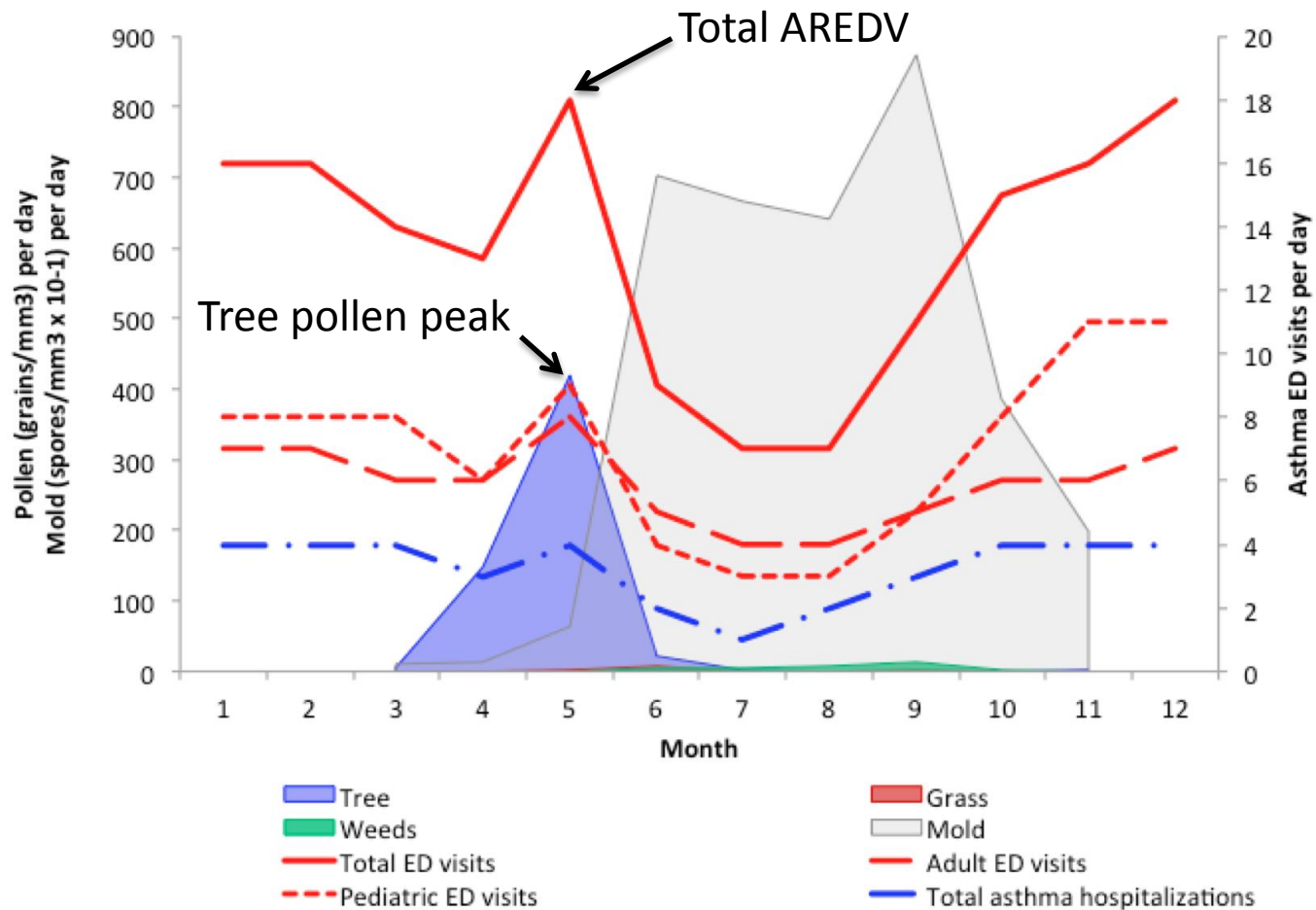
- From 2001-2008, there were a total of 42,065 AREDV.
- There was a large spring peak in total AREDV.



Tree pollen counts significantly correlated with both AREDV and ARH

- Tree pollen counts significantly correlated with
 - Total AREDV ($\rho = 0.3639$, $P < 0.001$)
 - Pediatric AREDV ($\rho = 0.33$, $p < 0.001$)
 - Adult AREDV ($\rho = 0.28$, $p < 0.001$)
- ARH positively correlated with tree pollen counts ($\rho = 0.2389$, $P < 0.001$).

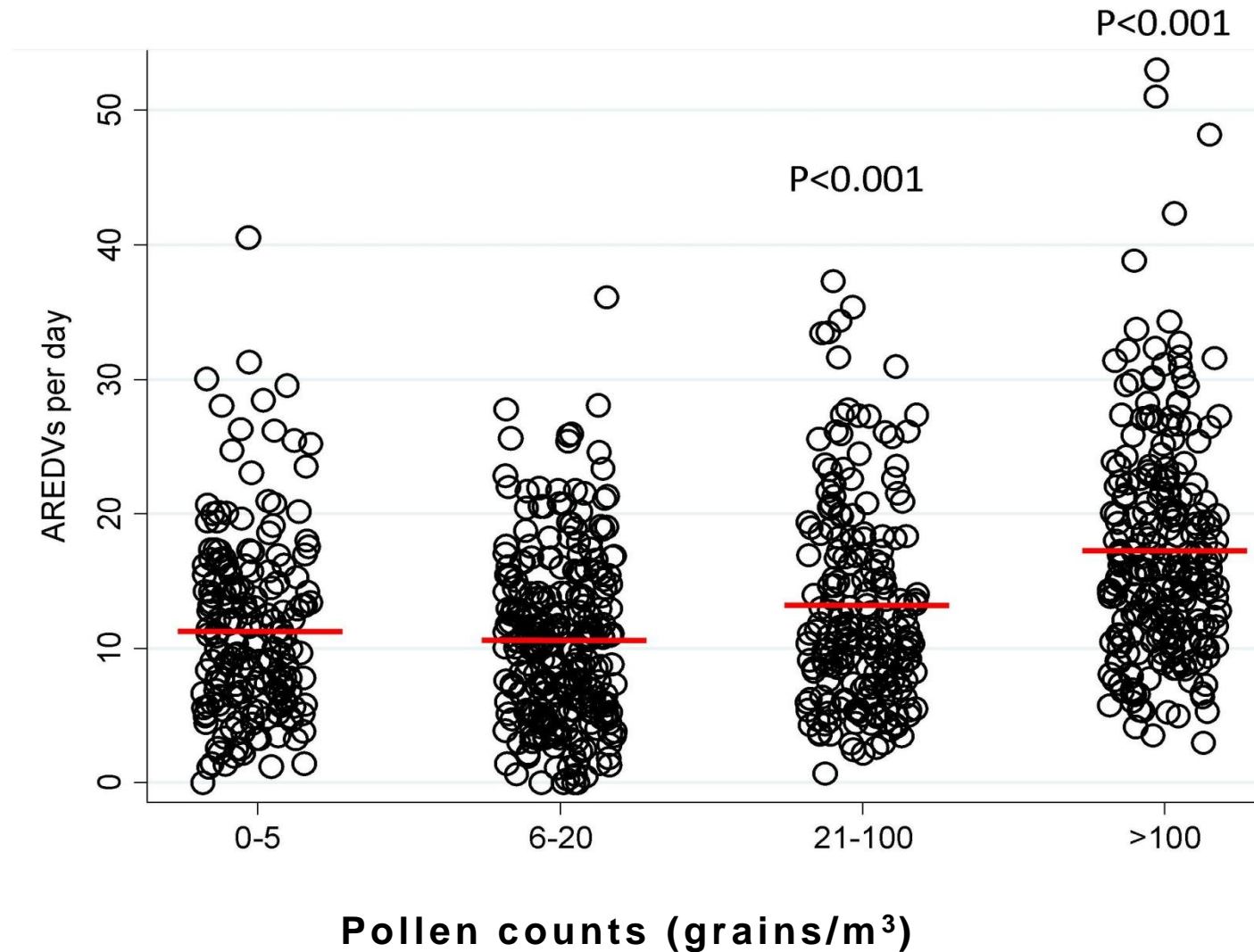
Median pollen, mold counts, asthma-related ED visits and asthma-related hospitalizations 2001-2008



AREDV strongly associated with total pollen counts

- When comparing the mean daily AREDV's in the highest quartile of pollen counts with the mean daily AREDV's of all other quartiles, we found a strong association between high pollen counts and increased asthma ED visits.
- When daily pollen counts exceeded 100 particles/m³, AREDV increased from a mean of 11.4 (+/- SD 6.6) to a mean of 17.1 (+/- SD 8.2), $p < 0.001$.

Association between asthma ED visits and total pollen counts



Which other variables might affect AREDV?

- As a follow-up study, we recently looked at daily measurements of humidity, temperature, air pollutant (nitrogen dioxide and particulate matter 2.5) concentrations, and tree pollen counts.
- We categorized these variables into quartiles and compared these variables in relation to AREDV.

Tree pollen counts drive the AREDV spring peak

- The highest quartile of daily tree pollen counts resulted in consistently high AREDV, regardless of pollutant or humidity measurements.
- In contrast, on days when humidity and air pollution levels were high, but tree pollen counts were low, AREDV were not significantly increased.

Conclusions

- Asthma morbidity and mortality are very high among minority inner-city populations.
- In a highly urbanized area such as the Bronx, there exists a significant association between spring asthma-related ED visits and tree pollen concentrations.
- Early anticipation of spring pollen peaks based on ongoing surveillance could potentially guide clinical practice and minimize asthma-related ED visits in the Bronx.

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