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The Role of Outdoor Tree Pollen Levels on Healthcare Visits for Respiratory Infections in Infants and Toddlers: A Case Cross-over Analysis

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The Role of Outdoor Tree Pollen Levels on Healthcare Visits for Respiratory Infections in Infants and Toddlers: A Case Cross-over Analysis

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Describe role of Submitting/Presenting Trainee in this project (limit 150 words):

Pulmonary Fellow

Background, Objectives/Goal, Methods/Design, Results, Conclusions limited to 500 words

Background:

Respiratory infections (RI) are a major public health problem and among the top reasons for seeking medical care in infants and toddlers. There is recent evidence that exposure to anthropogenic and biogenic particulate matter (PM) increase the risk of respiratory illness in this vulnerable population. Tree pollen grains are common outdoor allergens which are widely dispersed. Atmospheric particulate matter adsorb to the pollen grains which may enhance their allergenicity, promote disruption of respiratory epithelium, and promote local inflammation. Allergen sensitization in infants and young children is low, providing an ideal population for studying non IgE mediated effects of pollen on the respiratory system.

Objectives/Goal

We evaluated the short term effect of outdoor tree pollen levels on ER visits/hospitalizations for respiratory infections in infants and toddlers.

Methods/Design:

Over three consecutive tree pollen seasons, we identified 0-3 year years old who were seen in the urgent care/emergency department, or hospitalized for RI. Case-crossover analysis with a time stratified, symmetric, bi-directional design was used to control for day of the week/seasonal effects, and independent variables unique to subjects. Associations between daily total outdoor tree pollen level and health care visits(HCV) were calculated using conditional logistic regression. Models were adjusted for meteorological variables and common atmospheric pollutants(see table).

Results:

Crude and adjusted odds ratios of event(HCV for RI) and pollen exposures on the day of event with lag exposure(days 1-5) are presented(see table). The strongest association occurred with exposure on the day of event demonstrating a 7.6% increase in risk per 1000grain/m³($p < .001$) increase in pollen. The odds of HCV increased with each categorical increase in pollen level. Again, this association was highest on the day of event when the pollen level was very high (odds ratio[OR], 2.538; 95% confidence interval[CI], 2.37-2.71; $P < .001$). The risk lessened from lag exposure 0-5 but was significant for all exposure windows. All associations remained robust when modeled with meteorological and environmental covariates.

Conclusions:

Our results suggest that outdoor pollen levels may be utilized as a predictor of HCV for RIs in infants and toddlers during tree pollen season. This association was strongest on the day of HCV suggesting an immediate effect of pollen grains on nasal and/or respiratory epithelium and supports recent studies demonstrating the allergenicity of tree pollen may be on the rise and clinically relevant in infants/toddlers. How pollution, in the form of atmospheric particulate matter, contributes to these finding should be studied further.