Breastfeeding, aeroallergen sensitization and environmental exposures during infancy are determinants of childhood allergic rhinitis at age three

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Rationale: Early life predictors of childhood allergic rhinitis (AR) are not well defined. Few studies have addressed host characteristics and environmental exposure determinants of AR in three year old children. The objective of this study is to identify host characteristics, indoor and outdoor environmental exposures during infancy at age one that predict AR at age three in a longitudinal birth cohort.

Methods: High risk children from Greater Cincinnati in the Cincinnati Childhood Allergy and Air Pollution Study (CCAAPS) were followed annually in a large birth cohort study from birth to age three. The primary outcome, allergic rhinitis (AR) was defined by parental report of sneezing, runny or blocked nose in the prior 12 months and a positive skin prick test (SPT) to at least one of 15 aeroallergens. AR children were compared to non-atopic, non-symptomatic children. Environmental and standardized medical questionnaires determined exposures and clinical outcomes. Primary activity area dust samples were analyzed for house dust endotoxin (HDE) and (1-3)-β-D-glucan. Fine particulate matter (PM₂.₅) sampled at 27 monitoring stations were used to estimate personal elemental carbon attributable to traffic (ECAT) exposure by land use regression model.

Results: Of 361 children in this analysis, 116 had AR and 245 were non-atopic, non-symptomatic. Prolonged breastfeeding in African-American children (aOR 0.8; 95% CI 0.6-0.9) and multiple children in the home during infancy were protective of AR (aOR 0.4; 95% CI 0.2- 0.8). Food SPT positivity and tree SPT positivity at age one increased the risk of AR at age three (aOR 4.4; 95% CI 2.1- 9.2) and (aOR 6.8; 95% CI 2.5- 18.7), respectively. HDE exposure was associated with AR, with low and high HDE exposure being protective, (aOR, 0.5; 95% CI, 0.3-0.8) and (aOR, 0.002; 95% CI, <0.001-0.1), respectively. In contrast, medium HDE exposure was associated with an increased risk of AR (aOR, 6.3; 95% CI, 2.3-17.2). ECAT and ETS exposure showed no effect on AR.

Conclusions: Prolonged breastfeeding in African-Americans and multiple children in the home during infancy reduced the risk of AR at age three whereas percutaneous reactivity to food and tree allergens enhanced risk. HDE exposure modified the risk of AR bidirectionally depending on the level of HDE exposure.