



Letter

Relationship of pediatric eosinophilic esophagitis diagnosis to pollen and mold counts

The etiology of eosinophilic esophagitis (EoE) is largely believed to be related to food allergies. However, recent studies in the adult population have suggested that seasonal variation in EoE diagnosis may be associated with seasonal aeroallergens.^{1–3} Grass pollen counts have been correlated with EoE diagnosis in adults,² but the relation between respiratory allergens such as pollen and mold spores in pediatric EoE diagnosis has not been determined. This study of pediatric patients with EoE diagnosed in an urban environment, known to have high environmental mold spore counts (>50,000 counts per cubic meter of air),⁴ was performed to determine the relation of pollen and mold allergens with the timing of EoE diagnosis.

Retrospective chart and biopsy review of 457 patients with EoE pathologic diagnoses from January 2006 through December 2010 was performed. Clinical data included age, sex, endoscopy date, symptoms, and comorbid conditions (allergic rhinitis, asthma, eczema, and food allergies). Biopsies were assessed by a pathologist for EoE histologic findings. Patients without clinicopathologic diagnoses were excluded. Patients were identified if the eosinophil count per high-power field was at least 15 and typical clinical symptoms were noted without resolution with proton pump inhibitor therapy. The primary reason for exclusion was the absence of proton pump inhibitor therapy before endoscopy. Another reason was the presence of comorbid conditions such as inflammatory bowel disease, celiac disease, gastroesophageal reflux disease, and hypereosinophilic syndrome. Evidence of environmental and food allergens was identified in a subset of patients with serum specific IgE and immediate hypersensitivity skin prick or patch test reactions. Seventy-five percent of patients were seen solely by a gastroenterologist and, in this population, allergy testing was not performed.

A Burkard wind-driver 7-day recording volumetric spore trap was used to collect pollen and mold counts every 24 hours Monday through Friday by the Houston Department of Health and Human Services. Mean tree, grass, and weed pollen and mold spore counts were recorded monthly. Pollen seasons were identified based on average monthly pollen counts. The primary research question concerned the association between the proportion of monthly biopsies confirming EoE diagnosis and monthly pollen or mold counts. A random intercept model was used to model the proportion of EoE diagnoses each month as a function of pollen and mold count data. Comorbid conditions and symptoms were compared between diagnosis seasons (tree/grass vs weed) using the Fisher exact test or Mann-Whitney *U* test. Statistical significance was assessed at the .05 level, and no adjustments were made for multiple hypothesis testing.

Eighty-one patients (8 months to 19 years old, 70% boys) had clinicopathologic features of EoE. Sixty-two percent of patients were white, but 18.5% had an undetermined ethnicity. Ninety-eight percent of patients lived within 30 miles of the pollen or mold collection site. Documented food allergies were present in 39% (31 of 79) of EoE cases, 26% (21 of 81) had allergic rhinitis, 19% (15 of 81) had asthma, and 9% (7 of 80) had eczema. The most common presenting symptom was abdominal pain (49%) followed by nausea or vomiting (44%). There were no statistically significant differences in comorbidities or symptoms between tree or grass and weed seasons. However, 53% of patients (17 of 32) diagnosed with EoE in the weed season also had been diagnosed with food allergies compared with 30% of patients (14 of 47) diagnosed in the tree or grass season ($P = .06$). A minority of the cohort had allergy testing ($n = 19$). Of these 19 patients, 16 (84%) had documented sensitization. Five (26%) had only seasonal sensitization (tree, grass, or weed), 4 (21%) had only perennial sensitization (dust, mold, or animal), 7 (37%) had seasonal and perennial sensitization, and 3 (16%) were nonallergic. Eosinophilic microabscesses were associated with a significantly larger eosinophil count per high-power field ($P < .001$). The median eosinophil count per high-power field in patients with microabscesses ($n = 37$) was 60 (minimum 25, maximum 100) compared with 28 (minimum 15, maximum 100) in patients without microabscesses ($n = 44$).

Mold counts were highest from April to October, whereas pollen counts were highest from February to April secondary to high tree pollen counts (Fig 1). High pollen counts in October were due to weed pollen. The proportion of biopsies positively diagnosing EoE was not significantly associated with type of pollen (grass, tree, or weed), total pollen counts, or mold counts. The proportion of EoE diagnoses compared with total esophageal biopsies in this pediatric population was evenly distributed throughout the year without significant seasonal variation with pollen or mold counts. There was a decrease in the proportion of EoE diagnoses by 2.2% for every 100 total pollen count increase, showing a slight inverse relation, but this did not reach statistical significance ($P = .07$). Delayed diagnosis of EoE up to 4 weeks after pollen or mold count collection was evaluated by the random intercept model, given the potential delay in medical care and biopsy from symptoms resulting from increased pollen and mold counts. This analysis also showed no significant association between EoE diagnosis and allergen count.

In this study, pollen and mold counts had no statistically significant association with EoE pediatric diagnosis. However, the largest proportion of EoE diagnoses occurred during high mold spore months. Literature evidence shows food as a prominent driver for inflammation in EoE, a disease with increasing incidence.⁵ In 2007, food allergies were found to have a causative role in the pathogenesis of EoE in more than 90% of patients.⁶ However

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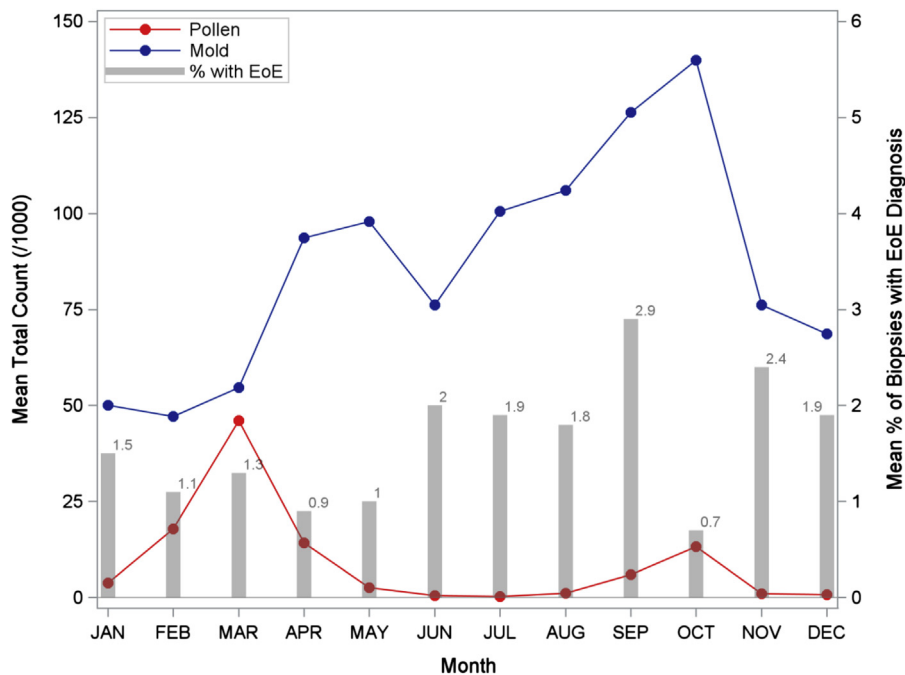


Figure 1. Distribution of mean pollen and mold counts by month and number of eosinophilic esophagitis (EoE) diagnoses for 2006 through 2010 in Houston, Texas.

in 2010, seasonal variation in the diagnosis of EoE in adults was reported in a retrospective chart review.² An increased number of diagnoses during seasons with high grass pollen counts was found in this adult population, although the season of symptom onset was not reported. Subsequently, an increased frequency of pediatric diagnosis in spring and summer was reported.⁷ However, pollen counts were not directly evaluated.⁷ Our study suggests adult EoE may be fundamentally different from pediatric EoE because the prolonged grass pollination season in southern Texas was not related to positive EoE biopsies.

Elitsur et al⁸ found no seasonal variation in their retrospective chart review of children diagnosed with EoE in rural communities. They suggested environmental confounders are causative in urban areas, where many EoE studies are performed, resulting in seasonal variation in diagnoses. Sorser et al⁹ also performed a retrospective review in an urban area and found no seasonal variation in a small cohort. However, the patients were not placed on a trial of proton pump inhibitors before their diagnostic biopsies.

This study assessed a large number of pediatric patients over a 5-year period with patient selection through strict diagnostic criteria and standardized collection of mold spore and pollen counts. Limitations of this evaluation include the lack of systematic symptom collection, lack of comprehensive patient assessment of sensitization, and potential bias in the retrospective design with lack of consistent documentation of the timing of symptom onset before biopsy and seasonality of symptoms. Standardized prospective studies will be helpful to more accurately define onset of EoE symptoms with pollen and mold counts and time of diagnosis. However, results of this analysis suggest pollen and mold counts are not significantly associated with the diagnosis of pediatric EoE, implicating this as a potential difference between adult and pediatric disease.

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