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TOBACCO EXPOSURE AND ASTHMA MORBIDITY IN PUERTO RICANS AND MEXICAN AMERICANS

Puerto Ricans on both the island and mainland experience the highest asthma morbidity rates of any race and ethnicity, whereas Mexican Americans have the lowest.^{1–3} Using a biologic measure of tobacco exposure, we attempted to determine whether the differences in asthma morbidity between these 2 ethnic groups were due to cigarette smoke exposure. The study protocol was approved by the Chicago public and Catholic schools and the institutional review boards at *Censored for Review*.

This exploratory, cross-sectional analysis was based on the English-only inception cohort established by the Chicago Initiative to Raise Asthma Health Equity study.⁴ Pulmonary obstruction was assessed using prebronchodilator forced expiratory volume in 1 second/functional vital capacity using the SpiroPro spirometer (Jaeger a subsidiary of VIASYS Healthcare/Cardinal-Health, Conshohocken, Pennsylvania).^{4,5} Saliva was collected using a collection pad (Quantisal; Immunalysis, Pomona, California). The cotinine concentration was extracted using an enzyme-linked immunosorbent assay (Salimetrics, State College, Pennsylvania) with a lower limit of detection of 0.05 ng/mL. Exclusions included participants reporting mixed ethnicity (15 children and 6 adults), those missing cotinine measurements (9 children and 13 adults), and children with cotinine levels greater than 8 mg/mL (1 child).

We defined a severe asthma exacerbation in the past year as experiencing an asthma episode that required spending 1 or more nights in the hospital, going to an emergency department, or requiring urgent medical care at the physician's office. Asthma symptom frequency was measured as the sum of days and nights in the past 2 weeks that the participant experienced wheezing, chest tightness, cough, or shortness of breath. Child quality of life was measured using a modification of the Children's Health Survey for Asthma.^{4,6,7}

The sample of 101 children and 70 adults is described in the Table 1. Half of the Puerto Rican and Mexican American children had cotinine levels between 1 and 8 ng/mL, suggesting recent environmental tobacco smoke exposure.⁸ All of the adults reporting that they did not smoke had cotinine levels less than 1 ng/mL; 16 of the 17 adults reporting that they currently smoked had

salivary cotinine levels greater than 8 ng/mL. Bivariate analyses were conducted between the descriptive variables and asthma morbidity outcomes. For children, asthma symptoms were associated with caregiver age ($P = .004$). Caregiver quality of lifewas associated with caregiver age, home ownership, and ethnicity ($P = .02$, $P = .01$, and $P = .006$, respectively). For adults, severe asthma exacerbations were associated with home ownership, self-reported smoking, and cotinine levels ($P = .02$, $P = .04$, and $P = .046$, respectively).

Independent predictors of the asthma outcomes were determined using backward stepwise elimination, retaining variables in the final models with $P < .05$. (Stata/IC 10.1 for Windows; StataCorp, College Station, Texas) Logistic regression was used for severe asthma exacerbations, negative binomial regression for asthma symptoms, and linear regression for caregiver asthma quality of life. For children, we looked at 3 outcomes. Both Puerto Rican ethnicity (odds ratio [OR], 2.61; 95% confidence interval [CI], 1.07–6.33) and private insurance (OR, 2.49; 95% CI, 1.02–6.12) independently predicted increased severe asthma exacerbations. Increased caregiver age predicted fewer asthma symptoms (incidence rate ratio [IRR], 0.92; 95% CI, 0.89–0.96). Puerto Rican ethnicity predicted lower caregiver asthma quality-of-life score (IRR, -0.32 ; 95% CI, -0.63 to -0.01), whereas increased caregiver age predicted a higher score (IRR, 0.03; 95% CI, 0.01–0.05). An interaction term for ethnicity $\times$ cotinine was not significant. For adults, 2 outcomes were analyzed. Severe asthma exacerbations were associated with Puerto Rican ethnicity (OR, 5.18; 95% CI, 1.29–20.84) and pulmonary obstruction (OR, 0.22; 95% CI, 0.05–0.94). Cotinine levels greater than 8 ng/mL, compared with levels less than 1 ng/mL, predicted increased severe asthma exacerbations (OR, 6.86; 95% CI, 1.43–32.85). No characteristics were independently associated with symptom frequency in adults.

In other analyses, we replaced cotinine with reported household smoking (child models) or current smoking (adult models). For children, the association with Puerto Rican ethnicity diminished and home ownership became a significant predictor of increased asthma symptoms. Other models did not change.

To our knowledge, this is the first study to report multiple indicators of asthma morbidity and objective markers of tobacco exposure for both Puerto Rican and Mexican American children and adults. In children, ethnicity remained a strong predictor of caregiver quality of life and severe asthma exacerbations despite controlling for environmental tobacco smoke and sociodemographics. In adults, ethnicity remained a strong predictor of severe asthma exacerbations after controlling for cotinine, pulmonary obstruction, and other sociodemographic characteristics. These analyses, although limited by the small sample size and exclusion of Spanish-speaking individuals, suggest that the disparities in asthma morbidity between Puerto Ricans and Mexican Americans cannot be fully explained by smoking behaviors. Other behavioral or biological factors should be investigated to explain adverse asthma outcomes in these populations.

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Table 1. Sociodemographic Characteristics, Smoking, and Asthma Outcomes of Children, Caregivers, and Adults With Asthma by Ethnicity

	Child or Caregiver			Adult		
	Puerto Rican Only (n = 53)	Mexican Only (n = 48)	P value	Puerto Rican Only (n = 39)	Mexican Only (n = 31)	P value
Demographic characteristics						
Age, mean (SD), y				34 (5)	29 (5)	<.01
Child age	11 (1.8)	10 (1.9)	.37			
Caregiver age	35 (5.6)	36 (7.7)	.54			
Female, %				77	77	>.99
Child	32	38	.57			
Caregiver	89	98	.12			
Education, % ^a			.01			>.99
Less than high school	23	19		18	16	
High school or general educational development	77	66		64	65	
College graduate	0	15		18	19	
Home ownership, %			.04			.88
Own	25	48		31	39	
Rent	68	44		59	52	
Live with family and friends	8	8		10	10	
Insurance, %			.24			.47
Private	51	63		54	45	
Public or other	49	37		46	55	
Pulmonary obstruction						
FEV ₁ /FVC ≤0.8, % ^b	33	29	.66	73	39	<.01
Smoke exposure						
Current smoker, %	26	31	.59	38	19	.12
Smoker in house other than respondent, %	21	42	.02	26	19	.58
Cotinine, mean (SD), ng/mL ^c	1.5 (1.1)	1.3 (1.1)	.53	71.0 (111)	39.0 (85)	.24
Cotinine, % ^c			.84			.39
<1 ng/mL	49	47		38	48	
1–8 ng/mL	51	53		25	32	
≥8 ng/mL				38	20	
Asthma morbidity outcomes						
Asthma quality of life score, ^d mean (SD)	3.9 (0.8)	4.3 (0.7)	<.01			
Total No. of symptomatic days and nights during past 14 days, median (IQR) ^e	4.5 (3–8.5)	4 (0–9)	0.28	7 (3–16)	5 (3–9)	.21
Two or more hospitalizations or urgent emergency department or physician's visits for asthma exacerbation during past 12 months, %	55	38	.08	59	39	.09

Abbreviations: FEV₁, forced expiratory volume in 1 second; FVC, forced vital capacity; IQR, interquartile range.^a Caregivers: Mexican n = 47.^b Child: Puerto Rican n = 39, Mexican n = 35; adult: Puerto Rican n = 37.^c Child: Puerto Rican n = 45; Mexican n = 47; adults: Puerto Rican n = 32, Mexican n = 25.^d Child: Children's Health Survey for Asthma.^{4,6,7}^e Child: Puerto Rican n = 48, Mexican n = 47; adults: Puerto Rican n = 38.

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NONEPISODIC ANGIOEDEMA WITH EOSINOPHILIA

Episodic angioedema with eosinophilia, also known as Gleich syndrome, was first described in 1984.^{1–3} This syndrome was characterized by recurrent peripheral angioedema, fever, weight gain, elevated serum IgM level, and peripheral eosinophilia of unknown origin. It affected predominantly females and had a benign, relapsing course, lacking any internal organ involvement. A nonepisodic variant of angioedema has also been reported by Chikama et al and is observed frequently in Japan.^{3,4} The nonepisodic variant consisted of a single attack of persistent edema of the extremities associated with peripheral eosinophilia, lack of IgM level elevation, and, normally, a less severe course than the episodic type. To our knowledge, this is the first report of idiopathic, rapidly progressing, nonepisodic angioedema with

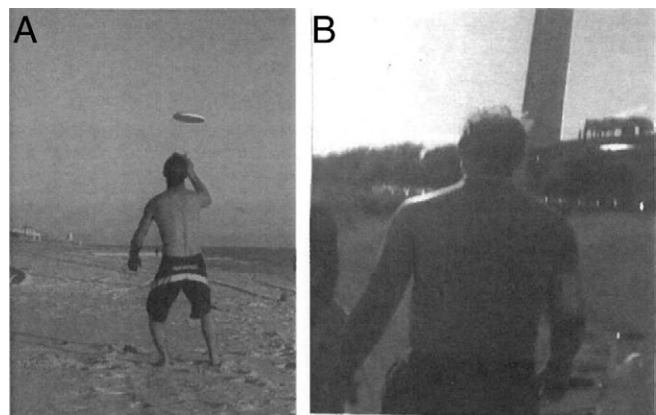


Figure 1. General appearance before (A) and during (B) the initial phase of the angioedema episode.

eosinophilia associated with mediastinal edema in a young man.

A 34-year-old, otherwise healthy construction worker presented to the emergency department in summer 2008 with generalized fatigue, muscle aches, slight fever, and significant upper extremities swelling with no evidence of rashes (Fig 1). He had been vacationing at his trailer in Southeastern Ontario but denied any prior respiratory tract infection, trauma, bug bites, or use of new medications. Initial investigations showed a marginally elevated peripheral white blood cell count (WBC) and eosinophil count. An upper-extremity blood clot was ruled out, and he was discharged home on comfort measures with a presumed diagnosis of a viral myositis. Two days later, he returned to the hospital with rapidly progressing generalized edema involving his face, neck, arms, upper chest, and abdomen. His weight had increased by 34.5%, his vital signs were stable, and he was afebrile. Physical examination revealed no rashes; he had no enlarged lymph nodes or organomegaly. Subsequently, he developed worsening shortness of breath requiring oxygen and pleuritic chest pain. His blood work showed a markedly elevated WBC and eosinophils count, peaking at $62.6 \times 10^9/L$ and $45 \times 10^9/L$, respectively; his initial hemoglobin level was 126 g/L, and his platelet count was $152 \times 10^3/\mu L$. He maintained normal levels of urea, creatinine, serum electrolytes, and liver enzymes. Computed tomography of the chest ruled out pulmonary embolus but revealed bilateral pleural effusions; cardiac magnetic resonance imaging demonstrated a small pericardial effusion, but no obvious infiltration of cardiac muscle was noted. The deltoid muscle biopsy performed at the initial emergency department visit revealed eosinophil infiltration with intact muscle fibers. Quantitative measurement of immunoglobulins, complement (C3, C4, C1 esterase inhibitor, and C1q binding), and vitamin B₁₂ levels were within normal limits. A bone marrow aspiration and biopsy confirmed marked hypereosinophilia with no leukemic features. Thorough workup failed to identify any infectious, parasitic, autoimmune, or neoplastic cause for this condition, including a lack of the *FIP1L-PDGFR* mutant gene. His symptoms responded well to oral steroids administered at 1 mg/kg. He was taken off oxygen within 4 to 5 days and his edema subsided; he had deconditioned significantly within 10 days and required intensive physiotherapy. He was discharged home on a 3-month, slow-tapering regimen of oral steroids and achieved his preex-

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