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Comorbidity of Atopy in Urban Adolescents with Asthma

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Over 4.4 million (9.8%) adolescents, between the ages of 11 and 21, in the United States (U.S.) reported to have current asthma in 2015.¹ Urban adolescents have a disproportionately high burden of asthma as indicated by their high asthma related morbidity.^{2–5} Atopic conditions are often implicated with asthma morbidity.⁶ Evidence has consistently shown that atopic conditions often co-occur with asthma, and children with severe asthma tend to report greater atopic burden.^{6–9} Allergic rhinitis, atopic eczema and food allergy are the three most frequently examined atopic conditions in epidemiological research. Despite the wealth of literature elucidating common atopic conditions in children with asthma and its implications for asthma morbidity, the majority are concerning young children. Moreover, simultaneous consideration of the three atopic conditions is rare, preventing the opportunity to assess the extent of comorbidities among the three conditions and their associations with asthma morbidity. This short report examines the prevalence of three common atopic conditions individually and concomitantly in a relatively large sample of urban adolescents with asthma and their relationships with asthma morbidity.

Study participants included 313 adolescents (11–20 years old) with persistent asthma recruited from three metropolitan cities in the U.S. including Buffalo NY, Baltimore MD and Memphis TN. The majority of the sample was recruited through clinician referrals from local hospitals or primary care practices (n=106), followed by self-referrals responding to school or community outreach (n=94), word of mouth (n=69) and study flyers (n=40). Parents reported physician-diagnosed food allergy, eczema, and allergic rhinitis. Adolescents provided data on healthcare utilization (hospitalization, Emergency Department visits, acute

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office visits, and asthma specialist visits), missed school days in the past three months, and symptom exacerbation (based on systemic steroid use). The study protocol was reviewed and approved by each Institutional Review Board of the academic institutions in the participating cities. Informed parental permission and adolescent assent were obtained, while consent was obtained directly from older adolescents (≥ 18 years old). The average age of participants was 14.58 (± 1.97) and 52% were female, and the majority (79%) black.

Seventy-percent reported at least one atopic condition, and 37% reported two or more atopy diagnoses concurrently. Figure 1 shows the prevalence of the three atopic diagnoses and four different combinations of them. Allergic rhinitis was the most prevalent followed by eczema and food allergy. One in four participants reported concomitant diagnoses between rhinitis and eczema, and almost 10% had all three diagnoses. According to our logistic regressions after controlling for adolescents' age and sex, healthcare utilization or school absenteeism was not significantly predicted by individual atopic conditions, except for rhinitis. Adolescents with allergic rhinitis were twice as likely to receive asthma specialist care (Odds Ratio (OR)=2.03, 95%CI 1.26–3.3, $p=.004$) than those without rhinitis. When allergic rhinitis co-occurred with food allergy or eczema, the odds of asthma exacerbation increased two fold compared to those without both conditions with OR=2.3 (95%CI 1.19–4.41, $p=.01$) and OR=2.18 (95%CI 1.25–3.79, $p=.006$), respectively. No other types of healthcare utilization or school absenteeism were found to be associated with atopic conditions either individually or in combination.

To our knowledge, this is the first study documenting the prevalence of three atopy diagnoses, albeit self-reported, among urban adolescents with asthma. Data showed staggering comorbidity between asthma and atopic conditions in urban adolescents. We also found that concomitant diagnoses of two or more atopic conditions were not uncommon. Of three diagnoses of atopy conditions, only allergic rhinitis was linked to specialist visits and symptom exacerbation particularly when coupled with other atopy diagnoses. Notwithstanding, atopic dermatitis or food allergy diagnosis *alone* does not appear to have direct relationships with healthcare utilization or symptom exacerbation, suggesting that these atopy conditions may exert no independent influence on asthma morbidity, particularly in urban adolescents. Alternatively, our failure to demonstrate the relationships might have been due to a moderating factor ameliorating the impact of atopy such as ongoing atopy management. Further research is needed to examine the scope of comorbidity between atopy and asthma in a larger adolescent population and to reevaluate the relationships between atopy and asthma morbidity by taking into account potential buffering factors.

This study is limited primarily due to its reliance on self-reported data that are potentially vulnerable to reporting bias. Nonetheless, self-reported medical diagnoses requiring ongoing management such as atopic conditions are still of great value given its relatively high accuracy when compared to medical records.¹⁰ Our findings suggest that clinicians be cognizant of the widespread comorbidity of atopy diagnoses and asthma among urban adolescents. Because of the implications of allergic rhinitis for asthma exacerbation, focused attention to the condition is particularly warranted. Although not all atopy conditions have an association with asthma morbidity, it is important to identify and manage atopy

simultaneously with asthma to alleviate atopy-related suffering and to improve quality of life in urban adolescents.

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Abbreviations

AR	Allergic Rhinitis
AE	Atopic Eczema
FA	Food Allergy
OR	Odds Ratio

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Figure 1.

Prevalence of common physician-diagnosed atopy conditions individually and in combination (N=313)