

## ORIGINAL ARTICLE

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# The Atopic March: From Skin to the Airways

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## ABSTRACT

Many patients with atopic eczema (AE) would “march” to develop allergic rhinitis (AR) and asthma. Physicians, patients and their families often do not appreciate the significance of these diseases as co-morbidities of atopy.

The aim of this study was to evaluate the prevalence and severity of airway atopies in patients with AE. AR and asthma severity were assessed in consecutive AE patients seen at a pediatric dermatology clinic by ARS (allergic rhinitis score) and ACT (asthma control test). Eczema severity (SCORAD and Nottingham Eczema Severity Score: NESS) were recorded.

110 patients with AE and 42 patients without AE were recruited. Allergic rhinitis and asthma were significantly more prevalent in patients with AE [odds ratio for AR was 2.9 (CI: 1.3 – 6.5) and for asthma 4.3 (CI: 1.3 – 16.10)]. 23 (45%) of the AE patients with AR reported that they were currently on oral antihistamine whereas none of the non-AE group reported such usage. Both groups reported relatively higher sneezing and nasal congestion scores and low “eye watering” score. Comparing mild with moderate-to-severe AE, there was essentially no difference between the prevalence of allergic rhinitis and asthma, or severity of symptoms by ARS and ACT, but females reported more severe symptoms of sneezing and itching nose.

We conclude that allergic disorders of airway are very common among AE patients independent of the eczema severity. Most of the patients have mild-to-moderate AR and asthma. There is a lot of room for parent/patient education, and childhood eczema may prompt early awareness of these airway co-morbidities of atopy.

**Keywords:** Allergic rhinitis; Asthma; Atopic eczema; NESS; Quality of life; SCORAD

## INTRODUCTION

Atopic eczema (AE) is a distressing disease

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associated with pruritus, sleep disturbance and impaired quality of life.<sup>1</sup> The prevalence of AE has been increasing in developed countries.<sup>2</sup> The presence of atopy, according to the theory of Atopic March, implies that young children with AE may develop airway allergy such as asthma or allergic rhinitis later in life.<sup>3,4</sup> Physicians, patients and their families often do not appreciate the significance of these diseases as co-

morbidities of atopy.<sup>5</sup> In addition, it is not clear if patients with more severe AE have more severe airway atopies. This study aimed to evaluate the prevalence and severity of airway atopies in patients with AE.

## PATIENTS, MATERIALS AND METHODS

We evaluated the prevalence of physician-diagnosed allergic rhinitis and asthma in consecutive patients >1 year of age seen at the pediatric dermatology clinic of a teaching hospital. AE is diagnosed according to Hanifin and Rajka's criteria.<sup>6</sup> Children without AE seen during the same period were also evaluated. AE severity (by SCORAD and Nottingham Eczema Severity Score NESS)<sup>7-10</sup> were determined. NESS is a simple and easy-to-perform score which assesses the symptomatology of eczema over the preceding 12 months. A validated Cantonese version is available.<sup>8-11</sup> NESS was performed on 11 children older than one year of age, and CDLQI on children older than five years. Severity of allergic rhinitis was evaluated with the total and component Allergic Rhinitis Score (ARS).<sup>12,13</sup> Severity of asthma was evaluated with the Asthma Control Test (ACT).<sup>5,14,15</sup> Patients were excluded if they suffered a nonspecific dermatitis, epidermolysis bullosa, acrodermatitis enteropathica or if the diagnosis was

unclear. The Clinical Research Ethics Committee of the Chinese University of Hong Kong approved this study. Continuous variables were compared between subjects with and without AD by Student *t* test. *P*-values less than 0.05 were considered to be statistically significant.

## RESULTS

Between July 2010 and December 2010, 107 patients with eczema and 42 patients with miscellaneous skin conditions (warts, acne, photosensitivity, xanthogranuloma cellulitis, alopecia, molluscum and naevi) were evaluated (Table 1). Fifty-one patients with AE (48%) and 10 without AE (24%) reported that they had physician-diagnosed AR, whereas 28 (26%) and 3 (7%) had physician-diagnosed asthma (Figure 1, *p*=0.008 and 0.01, respectively). There was no significant difference between AE and non-AE groups in AR severity (ARS 1.58 versus 1.33, *p*=0.5), or asthma severity (ACT 22.8 versus 24.0, *p*=0.7); both groups reported relatively higher sneezing and nasal congestion scores and low "eye watering" scores. Twenty-three (45%) of the AE patients with AR reported that they were currently on oral antihistamine whereas none of the non-AE group reported such usage.

Table 1. Allergic rhinitis and asthma symptomatology in eczema and no-eczema cases

Topics	Eczema (n=107)	No eczema (n=42)	<i>p</i> value
Age	11.47±4.67	7.88±4.53	<i>p</i> <0.001
Male	49(45.8%)	22(52.4%)	0.47
Allergic rhinitis	51(47.7%)	10(23.8%)	0.008
Overall ARS	1.58±0.81	1.33±0.52	0.47
Component ARS			
Sneezing	1.44±0.91	1.50±0.55	0.89
Watery rhinorrhoea	1.28±0.94	1.00±0.63	0.49
Nasal congestion	1.58±1.05	1.50±0.55	0.852
Itching nose	0.89±0.95	1.00±0.89	0.79
Itching eyes	1.06±0.92	1.00±0.63	0.89
Eye watering	0.44±0.73	0.50±0.55	0.86
Currently on oral antihistamine	23(45.1%)	0(0.0%)	( <i>p</i> <0.001)
Asthma	28(26.2%)	3(7.1%)	0.010
ACT	22.8±2.7	24.0±0.0	0.66

ARS: Allergic Rhinitis Score: 0 = No symptom, 1 = Very slight symptom, 2 = Moderate, 3 = Severe, 4 = Very severe.(12;13)

**Table 2. Allergic rhinitis and asthma characteristics in mild and moderate-to-severe eczema**

Topics	Mild eczema (n=57)	Moderate-to-severe eczema (n=53)	p value
Age	11.380±4.950	12.175±3.957	0.37
Male	23(40.4%)	27(50.9%)	0.27
Objective SCORAD	7.98±3.38	36.19±13.43	p<0.001
NESS	7.68±3.72	11.87±2.02	p<0.001
Allergic rhinitis	25(43.9%)	27(50.9%)	0.46
Overall ARS	1.53±0.64	1.62±0.92	0.76
Component ARS			
Sneezing	1.40±0.74	1.48±1.03	0.81
Watery rhinorrhoea	1.53±0.92	1.10±0.94	0.17
Nasal congestion	1.47±0.99	1.67±1.11	0.58
Itching nose	0.87±0.92	0.90±1.00	0.91
Itching eyes	1.13±0.83	1.00±1.00	0.68
Eye watering	0.27±0.59	0.57±0.81	0.20
Currently on oral antihistamine	10(40.0%)	13(48.1%)	0.55
Asthma	11(19.3%)	17(32.1%)	0.12
ACT	21.7±2.1	23.1±2.8	0.44

## DISCUSSION

Comparing mild with moderate-to-severe AE, there was essentially no difference between the prevalence of allergic rhinitis and asthma, or severity of symptoms by ARS and ACT (Table 2). Comparing AR self-reported severity between females and males, higher overall scores were among females ( $p = 0.046$ ) as well as more severe symptoms of sneezing ( $p = 0.026$ ) and itching nose ( $p = 0.042$ ) (Table 3).

AE is a common and distressing childhood disease associated with chronicity and impaired quality of life. The incidence of AE has been increasing in developed countries.<sup>2</sup> The incidence in Hong Kong is approximately 10%.<sup>16,17</sup> According to the “Atopic March” theory, many patients with AE would “march” to develop airway atopies such as allergic rhinitis (AR) and asthma.<sup>3,4</sup>

**Table 3. AR and asthma characteristics in boys and girls**

Topics	Male n=71	Female n=78	p value
Age	10.04±4.88	10.8±4.91	0.32
Objective SCORAD	23.80±18.23	21.37±16.47	0.48
Allergic rhinitis	30(42.3%)	31(39.7%)	0.76
Overall ARS	1.30±0.66	1.77±0.81	0.046
Component ARS			
Sneezing	1.15±0.67	1.73±0.94	0.026
Watery rhinorrhoea	1.05±0.83	1.41±0.96	0.20
Nasal congestion	1.60±1.05	1.55±0.96	0.86
Itching nose	0.60±0.82	1.18±0.96	0.042
Itching eyes	1.10±0.79	1.00±0.98	0.72
Eye watering	0.45±0.69	0.45±0.74	0.98
Currently on oral antihistamine	9(30.0%)	14(45.2%)	0.22
Asthma	18(25.4%)	13(16.7%)	0.19
ACT	22.9±2.9	22.8±2.5	0.99

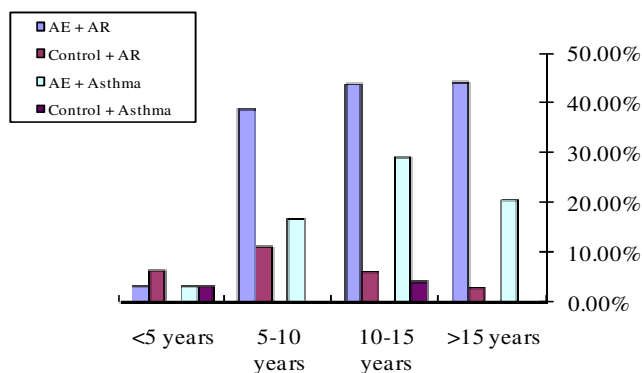


Figure 1.

On the basis of several longitudinal studies, approximately half of AD patients will develop asthma, particularly with severe AE, and two thirds will develop allergic rhinitis.<sup>3,4</sup> Epicutaneous sensitization has been thought to be responsible, with subsequent migration of sensitized T cells into the nose and airways, causing upper and lower airway disease. In this study, AR is present in nearly half of the AE patients and asthma reported in one-fourth. Patients and their families often do not appreciate the significance of these diseases. Preliminary prevention studies with oral antihistamines provide evidence that early intervention might slow the atopic march.<sup>3</sup> Nevertheless, early intervention is possible only when a physician caring for a child with AE maintains a heightened awareness for recognition and diagnosis of these associated atopic diseases, given that the symptoms of airway atopies are often confused with common viral respiratory tract illnesses.

It is not clear if patients with more severe AE have more severe airway atopies. In this study, we found that the prevalence of AR or asthma appear to be independent of AE severity but females appeared to report more severe symptoms of sneezing and nasal itching. In our cohort at a tertiary pediatric dermatology clinic, it appears that most AE patients had mild-to-moderate AR symptoms and nearly half of these patients were “currently” on oral antihistamines. One-fourth of our AE patients reported that they had physician-diagnosed asthma although most of them had mild intercurrent symptomatology according to the

ACT scores. The majority of these patients had not self-assessed their asthma severity. The ACT test is an easy-to-perform self evaluation test that would help manage AE patients with co-existing asthma.<sup>5,14,15</sup> The prevalence of airway atopies in a general practitioners’ setting or a dermatologist’s clinic might be different.<sup>5</sup> Nevertheless, the principle that pediatric care providers should consider evaluating asthma control on a regular basis regardless of the reason for the visit remains valid.<sup>5</sup>

This study serves to remind physicians of the prevalence of airway atopies in AE patients. Based on these findings, we conclude that there are a lot of rooms for patient education. AR and asthma are certainly very prevalent among patients with AE, and childhood eczema may prompt early awareness of these airway co-morbidities of atopy.

ACT: Asthma Control Test. The American Lung Association is recommending the, scored Asthma Control Test (ACT) for all asthma patients 12 years and older. The test is a 5- question assessment tool to help assess asthma control. The questions included in the test are based on measures of asthma control established by the National Institutes of Health. The total ACT score is based on a range of 5 to 25. A score of 19 or less may be a sign that asthma symptoms are not under control.(5; 14; 15)

Odds ratio for AR is 2.9 (CI: 1.3 – 6.5)

Odds ratio for asthma 4.3 (CI: 1.3 – 16.1)

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