

A clinical study of the prevalence and impact of allergic rhinitis in children with asthma

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ABSTRACT

Background: Allergic rhinitis (AR) and asthma are highly prevalent conditions that cause major illness worldwide. Surveys have shown that approximately 60-80% of children with asthma have symptoms of AR. **Objectives:** To study the prevalence of AR and its impact in children with asthma. **Materials and Methods:** A prospective cohort study of 130 children between the age group of 5 and 15 years, with the diagnosis of asthma, who presented with symptoms and signs of AR based on AR and comorbidities training module formed the study group. A detailed history and examination were recorded in a systematically designed pro forma. Apart from the routine investigation and management, these childrens nasal smear for eosinophils was taken to confirm the diagnosis of AR. **Results:** Among the study group, the prevalence of AR in children with asthma was found to be 76/130 (58%), of which 43/76 (56%) had intermittent and 33/76 (44%) had persistent AR. 66% of the children with AR had persistent asthma ($p < 0.001$). Nasal smear eosinophilia was positive in 54/76 (71%) of the children with AR. **Conclusion:** There is a high prevalence of AR in children with asthma. The presence of AR in children with asthma is associated with poor asthma control.

Key words: Allergic rhinitis, Childhood asthma, Nasal smear

Allergic rhinitis (AR) is a chronic inflammatory disease of the nose, and its symptoms include nasal congestion, rhinorrhea, sneezing, and itching. The prevalence of AR is increasing, and it is currently estimated to affect approximately 60 million people in the United States [1]. An international study of asthma and allergies in childhood study reports the prevalence of AR up to 40% [2]. 80% of children with bronchial asthma have associated AR and 30% of children with AR develop asthma later [3].

Bronchial asthma and AR often coexist, and rhinitis is a major risk factor for triggering asthma. The presence of AR commonly exacerbates asthma, increasing the risk of asthma attacks. Despite its high prevalence, there are only a few studies available on the impact of AR in children with asthma. Moreover, its impact on asthma in the pediatric age group has been poorly studied to date in the Indian population [4-6]. Hence, the present study was undertaken to elucidate the prevalence of AR in children with asthma and also to study its impact on asthma.

MATERIALS AND METHODS

This was a prospective, observational study conducted at Indira Gandhi Institute of Child Health, Bengaluru, for 1 year from October 2013 to September 2014. The study protocol was approved by the Institutional Ethics Committee. Totally, 130 children clinically diagnosed as asthma (as per Global Initiative for Asthma (GINA) guidelines) [7] in the age group of 5-15 years formed the

study group. These were evaluated for the presence of symptoms and signs of AR (as per the AR and comorbidities training module guidelines) [8]. After a detailed history, including history of cough, wheezing, breathlessness, diurnal and seasonal variations of symptoms, precipitating factors/triggering factors, history of similar episodes, family history of asthma, atopy, AR, treatment history, the severity of asthma was assessed and classified into intermittent asthma and persistent asthma based on GINA guidelines. Persistent asthma was further classified into mild, moderate, and severe persistent asthma. AR was diagnosed clinically if ≥ 2 of the following symptoms were present for > 1 h on most of the days: Recurrent sneezing, nasal discharge, nasal itching, and nasal blockage. The severity of AR was assessed using AR and its impact on asthma 2010 update. These children were subjected for investigations, including anterior rhinoscopy, spirometry, absolute eosinophil count (AEC), and nasal smear for eosinophils. Skin prick test and serum specific immunoglobulin E (IgE) were not performed due to logistic reasons and financial constraints. An AEC value of $\geq 440/\mu\text{L}$ considered as significant [9]. Nasal smear for eosinophils were considered to be positive when ≥ 5 eosinophils found in any one high power field [10].

Statistical Analysis

All data were analyzed using SPSS software version 18.0 with 95% confidence interval. Continuous variables were expressed in

terms of mean \pm standard deviation. Categorical variables were expressed in terms of frequencies and percentages. Associations were calculated between relevant parameters using Chi-square test. A $p < 0.05$ was considered significant.

RESULTS

A total of 130 children with asthma enrolled in the study, majority of the children 79/130 (61%) were in the age group of 5-10 years and 51/130 (39%) were in the age group of 11-15 years. 86/130 (66%) were males, and 44/130 (34%) were females. Males were predominately affected than females in the ratio of 2:1. The prevalence of AR in children with asthma was 76/130 (58%). The majority of the children with AR had persistent asthma (66%), ($p < 0.001$) as shown in Table 1.

The AEC was elevated ($>440/\mu\text{L}$) in 53/76 (71%) of children with AR ($p < 0.001$). Among children with AR, 71% had positive nasal smear eosinophilia ($p < 0.001$).

DISCUSSION

Across various studies worldwide, it has been observed that high prevalence of AR in children with asthma and presence of AR is associated with poor asthma control. In the present study, the prevalence of AR in children with asthma was 76/130 (58%). Similar observations were noted by Alsamaraei et al. [11] 320/564 (56.9%), Padilla et al. [12] 128/201 (63.6%), de Groot et al. [13] 157/203 (76.2%), AR is a common comorbid condition associated with asthma.

The concept of “one airway, one disease” [14] was introduced in view of similarity of allergic inflammatory cells, inflammatory mediators, and cytokines between upper and lower airways. AR and asthma although are separate disease entities, concurrent asthma in AR patients and concurrent AR in asthmatic patients should be identified and both AR and asthma should be treated simultaneously instead of treating asthma alone to achieve good control of asthma.

In the present study, 71% of children with AR had nasal smear eosinophilia ($p < 0.001$). Similar observations were made by Crobach et al. [15] (81%), Lans et al. [16] (43%), Sanli et al. [17] (57%), Miller et al. [18] (80%), and Murray [19] (93%). Other tests used to diagnose nasal allergy are skin prick test and serum specific IgE tests, these tests are only supportive evidence [20]. Hence, nasal cytology for eosinophilia is a simple, economical, and non-invasive useful test in the diagnosis of nasal allergic disorder.

The present study had shown that the presence of AR is associated with persistent asthma in 66% of the children as

compared to intermittent asthma in 11% cases. Similar observation was made by Padilla et al. in a cross-sectional study in Peruvian school children. In their study, AR was present in 66.4% of the 256 children with asthma recruited from 5 schools to Lima and Callao cities. The trend analysis showed a positive association between AR and the probability of inadequate asthma control. It was associated with an increased prevalence of inadequate asthma control, with adjusted prevalence ratios of 1.53. Another study by de Groot et al. showed 76.2% prevalence of AR in children with asthma. Asthma control questionnaire scores were worse in children with AR than in those without AR.

Limitations of our study were that skin prick test and serum specific IgE levels were not done due to logistic reasons and financial constraints. Second, the study population is too small to conclude and the results cannot be extrapolated to the entire population.

CONCLUSION

There is a high prevalence of AR in children with asthma. Co-occurrence of the symptoms of the two diseases suggests that AR and bronchial asthma share a common pathogenesis and should be treated as a single airway disease; hence, the concept of “one airway, one disease” should be recognized.

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Table 1: Association of severity of asthma and allergic rhinitis

| Severity of asthma | Allergic rhinitis | | Total | p value |
|--------------------|-------------------|------------|-------|---------|
| | Present (%) | Absent (%) | | |
| Intermittent | 2 (11) | 17 (89) | 19 | <0.001 |
| Persistent | 74 (66) | 37 (34) | 111 | |
| Total | 76 | 54 | 130 | |

- associated with poor asthma control in children with asthma. *Thorax*. 2012;67(7):582-7.
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