Rhinitis is also Common in Infants with Asthma

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ABSTRACT

The aim of this study was to assess the frequency of rhinitis in asthmatic infants. A cross-sectional study was conducted using clinical data obtained from a standardized allergy work-up form that includes specific questions on common allergic diseases. Asthmatic patients were seen at the first visit to the Pediatric Allergy Unit, from January 2001 to January 2006, were selected for analysis. Diagnosis of allergic rhinitis was based on the presence of two or more nasal symptoms (sneezing, itching, congestion and rhinorrhea). Allergic sensitization was assessed by skin prick test for Dermatophagoides pteronyssinus, Blomia tropicalis, Blattella germanica, Lolium perenne, dog and cat danders.

Four hundred and ninety-three infants (under 2 years of age) were selected from a total of 1543 asthmatics aged 0-14 years, 58% males. Physician diagnosis of rhinitis in infants was registered in 367 (74%) and 131 (36%) had positive skin prick test to at least one allergen. Infants were more frequently sensitized to Dermatophagoides pteronyssinus (43%) and Blomia tropicalis (27%). Among asthmatic children ≥2 years old, 890 (84%) also had rhinitis, 773 (87%) were atopic. Among those children with rhinitis, one hundred and eighty six were fully skin prick tested with a standard panel of common aeroallergens. There was no difference between sensitization in asthmatic infants and older asthmatic children with allergic rhinitis. Thus the frequency of rhinitis in asthmatic infants as well as atopic sensitization were similar to older children.

Key words: Asthma; Infants; Rhinitis

INTRODUCTION

Rhinitis is an important health problem affecting the quality of life of a large part of the child population. Allergic rhinitis is a symptomatic disorder of the nose induced after allergen exposure by an immunoglobulin E (IgE)-mediated inflammation of the membranes lining the nose. Allergic rhinitis is a major chronic respiratory disease due to its high prevalence and to the burden it imposes on quality of life and work/school performance. Allergic rhinitis and asthma in preschool children are difficult to diagnose, the symptoms often being confused with those of infectious rhinitis. However, symptoms that persist longer than 2 weeks should prompt a search for a cause other than infection. Allergic rhinitis and asthma are systemic inflammatory conditions and often coexist. The interactions between the upper and the lower airways have been extensively...
investigated and have supported the concept of one airway one disease. Approximately 80% of asthmatics have rhinitis and 30%-40% of patients with rhinitis have asthma. For those having both, severity of rhinitis is directly related to severity of asthma.\textsuperscript{2}

There is large variation in the prevalence of rhinitis symptoms in children and adolescents throughout the world.\textsuperscript{3} Allergic rhinitis is common in patients with asthma and should predict it in adults.\textsuperscript{2}

Despite the recognition that rhinitis affects an increasing proportion of preschool children, there is at present a paucity of epidemiologic data regarding its distribution, risk factors and natural history. Moreover, infectious rhinitis is extremely common and, like allergic rhinitis,\textsuperscript{4} may be associated with episodic wheezing. The prevalence of respiratory allergies in children from birth to 4 years is 6% while 4% are reported to have rhinitis.\textsuperscript{5} Although the prevalence of rhinitis increases later in life,\textsuperscript{6} the actual prevalence in preschool children is still a matter of discussion. Physician-diagnosed allergic rhinitis may occur in more than 40% of children by the age of 6.\textsuperscript{7}

The prevalence of allergic rhinitis is 10% to 30% in adults and up to 40% in children.\textsuperscript{2} Nonetheless there are no data on its occurrence in infancy and on the association of rhinitis with asthma in this age group. The aim of this study was to assess the frequency of rhinitis in asthmatic infants.

**PATIENTS AND METHODS**

A cross-sectional study using clinical data obtained from a standardized allergy work-up form that includes specific questions on common allergic diseases. At the initial visit parents are asked on symptoms of allergic skin and respiratory conditions as well as a review of other systems. Asthma diagnosis was considered in recurrent wheezers (≥3 episodes), irrespective of precipitating factors but in accord to family and personal history of atopic disease. Asthmatic patients seen at the first visit to the Pediatric Allergy Unit, from January 2001 to January 2006, were selected for analysis. Diagnosis of rhinitis was based on the presence of two or more nasal symptoms (sneezing, itching, congestion and rhinorrhea). Allergic sensitization was assessed by skin prick test with glycerinated allergenic extracts (IPI-ASAC Brazil) *Dermatophagoides pteronyssinus* (Dp), *Blomia tropicalis* (Bt), *Blattella germanica* (Bla), *Lolium perenne* (Lol), dog and cat danders. This panel consisted of common sensitizing aeroallergen to our population based on regional prevalence.\textsuperscript{8} A test was considered positive if wheal diameter ≥3mm and for allergic rhinitis, patients should have reacted to at least one allergen.\textsuperscript{9} Data were entered in MS-Excel, categorical variables were analyzed by non-parametric chi-square test and Fischer’s exact test. The Institutional Review Board approved this protocol.

**RESULTS**

Four hundred and ninety-three infants (under 2 years of age) were selected from a total of 1543 asthmatics aged 0-14 years, 58% males, allowing complete chart information. Physician diagnosis of rhinitis in infants was registered in 367 (74%) and 131 (36%) had positive SPT to at least one allergen. Infants were more frequently sensitized to Dp (43%) and Bt (27%). Skin prick tests were not undertaken in 150 (30.4%) infants. Among asthmatic children ≥2 years old, 890 (84%) also had rhinitis, 773 (87%) were atopic and one hundred and sixty (11%) were not skin prick tested for different reasons (Figure 1).

Among those children with rhinitis, one hundred eighty six were fully skin prick tested with a standard panel of common aeroallergens. There was no difference between sensitization in asthmatic infants and older asthmatic children with allergic rhinitis (Table 1).

**DISCUSSION**

The present study shows that rhinitis is commonly diagnosed among asthmatic infants less than two years of age. Stratifying asthmatic children by age, infants under 2 years had similar prevalence of rhinitis than older. Moreover, allergic rhinitis was more frequently found in older children, but infants were less skin prick tested than others.

<table>
<thead>
<tr>
<th>Children</th>
<th>&lt;2 years n=21 (%)</th>
<th>≥2 years n=165 (%)</th>
<th>p-value\textsuperscript{1}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polisensitized rhinitis</td>
<td>9 (43)</td>
<td>118 (71)</td>
<td>0.14</td>
</tr>
<tr>
<td>Monosensitized rhinitis</td>
<td>2 (9.5)</td>
<td>17 (10.3)</td>
<td>0.63</td>
</tr>
</tbody>
</table>

\textsuperscript{1}Exact Fischer test
There is a large variation in the prevalence of rhinitis in children around the world demonstrated by the standardized written-questionnaire of the International Study of Asthma and Allergies in Childhood (ISAAC). The ISAAC phase III involved 193,404 schoolchildren ages 6-7 years from 37 countries and 304,679 adolescents aged 13-14 years from 56 countries, and demonstrated prevalence of nasal symptoms associated with itchy watery eyes of 2,2% to 24,2% in children and of 4,5% to 45,1% among adolescents. There was a slight worldwide increase in the prevalence of rhinoconjunctivitis, both in 13- to 14-year-old and 6- to 7-year-old children, but the variations were large among the countries and there was no consistent regional pattern. The reasons for this wide international variation in the prevalence of rhinoconjunctivitis are not understood. Over the past 40 yr, there has been a pronounced increase in the prevalence of childhood allergies in industrialized countries. This increase may not yet have peaked, not even in countries with a high prevalence, as indicated by an increase in severe rhinoconjunctivitis. In Brazil, the ISAAC study has shown that, the prevalence of rhinoconjunctivitis in children and adolescents ranged from 10,3% to 17,4% and 8,9% to 28,5%, respectively. In our population the prevalence of rhinitis has increased 21% in the past six years.

The nasal airways and their closely-associated paranasal sinuses are an integral part of the respiratory tract. The nasal and bronchial mucosa present similarities and one of the most important concepts regarding nose–lung interactions is the functional complementarity. Most patients with asthma have rhinitis suggesting the concept of one airway one disease. The presence of allergic rhinitis commonly exacerbates asthma, increasing the risk of asthma attacks, emergency visits and hospitalizations for asthma. However, not all patients with rhinitis have asthma and there are differences between rhinitis and asthma. The majority of patients with asthma experience rhinitis symptoms. However, in many instances, symptoms may predominate in one organ and be hidden or unrecognized in other organs even though they exist. In preschool children, nasal
symptoms and wheezing may present a different relationship than later in life.\textsuperscript{14} Rhinitis is a factor independent of allergy in the risk for asthma.

Comparing children skin prick tested for all standardized panel of common aeroallergens there was no difference in sensitization between the groups. The limitation of this study was a greater number of children under 2 years that were not skin prick tested than older children, and it should have influenced the smallest frequency of asthmatic infants with allergic rhinitis.

Govaere et al., demonstrated that association of allergic symptoms with sensitization is significantly higher in the older but less pronounced in preschool children.\textsuperscript{15} Rhinitis was a strong predictor of adult-onset asthma in the European Community Respiratory Health Survey. The risk is higher among allergic rhinitis patients sensitized to inhalant allergens.\textsuperscript{16} These findings in adults are similar to a German birth cohort in which sensitization to perennial rather than seasonal allergens in the first years of life were risk factors for the development of asthma.\textsuperscript{17} Data on rhinitis provided by the Tucson study revealed that children who developed rhinitis in the first year of life were more likely to have a diagnosis of asthma at age of six.\textsuperscript{7}

Sensitization to inhalant allergens is a risk factor for wheezing. In a population-based birth cohort the sum of IgE antibodies to inhalant allergens at age 3 years strongly predicted the persistence of symptoms to children at 5 years of age for those who have wheezed within the first 3 years of life.\textsuperscript{18} Aeroallergen sensitization rarely begins before 6 months of age but may start between 6 months and at 2 years of life.\textsuperscript{19} A positive skin test reaction or the presence of serum specific IgE does not necessarily mean that an IgE-mediated allergy is related to symptoms, as skin prick tests are positive in symptom-free individuals.\textsuperscript{20}

The implications of our findings include the decision of treatment of allergic disease in infants. For instance, subcutaneous immunotherapy is established as effective treatment for patients with IgE-mediated reactions.\textsuperscript{21,22} Meta-analyses have confirmed that sublingual immunotherapy is also effective therapy for allergic rhinitis and asthma.\textsuperscript{23} Allergen-specific immunotherapy has a long-lasting benefit in addition to the potential for preventing asthma in children with seasonal allergic rhinoconjunctivitis and to reduce the development of new sensitizations.\textsuperscript{24,25} Children under 5 years of age can have difficulty cooperating with an injection immunotherapy program. Therefore the selection of patients that will benefit from immunotherapy might involve other clinical aspects and treatment should be individualized in younger children though there is no contraindication for this procedure.\textsuperscript{26}

Another issue to be considered is that wheezing is common in the first 3 years of life, yet only a fraction of all infants with wheeze will go on to develop persistent asthma. Asthma symptoms can precede allergen sensitization in approximately 25\% of children with recurrent wheeze in preschool age.\textsuperscript{27} Asthma remission is associated with onset of wheezing before 2 years, infrequent episodes of wheeze, less severe asthma, and male sex. Those with indoor allergen sensitization by 3 years have greater impairment in lung function compared with those who develop sensitization by 5 years.\textsuperscript{28} Asthma begins in the first 3 years of life, allergic sensitization and rhinitis are risk factors for its persistence but treatment should not be aggressive if the condition is transient.

In conclusion, the frequencies of rhinitis in asthmatic infants as well as atopic sensitization were similar to older children, when they were fully skin prick tested. The most common sensitizing agent was house dust mite Dp. Diagnosis and definition of allergic disease remains difficult at pre-school age. The presence of nasal symptoms may be helpful for the diagnosis of asthma and it is a co-morbidity that needs to be identified and treated even in young children. Natural history of allergic rhinitis and the use of nasal corticosteroids as well as immunotherapy in that vulnerable age group with rhinitis and asthma deserve further studies.

REFERENCES

Rhinitis in Asthmatic Infants