Intradermal skin testing in a aeroallergic Thai children

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Objective: To study the prevalence of sensitization to various aeroallergens in allergic Thai children

Design: Retrospective study

Setting: Out patient, Allergy clinic, Department of Pediatric, Faculty of Medicine, Chulalongkorn University.

Subjects: 305 allergic Thai children, aged 6-15 years with moderate to severe symptoms of asthma and or allergic rhinitis had performed intradermal skin testing with 10 common aeroallergens during the period January 1992 and June 1997

Results: There were 100 females and 205 males with an average age of 8.9 years. 57.37% of the patients had asthma, 26.9% had allergic rhinitis and 15.73% had both diseases. 85.8% of the patients had positive family history of atopy. At least one positive skin test was 98.04%. The prevalence of sensitization to various aeroallergens were as follows; mite mixture 92.13%, house dust 89.18% cockroach 53.77% mixed grass 53.11%, feather 51.15%, kapok 42.62%, mixed mold 35.08%, acacia 34.09%, dog 27.87% and cat 13.77%

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Conclusion: This findings highlight the association of specific aeroallergens with upper and lower respiratory allergy. The two most important aeroallergens were house dust and mite. So therapeutic efforts should be focused on education of the parents about relevant allergens and advising about techniques for reducing exposure especially in early childhood with a positive family history of atopy.

Key words: Allergen, Skin testing, Thai children.

Reprint request: Ngamphaiboon J, Department of Pediatrics, Faculty of Medicine, Chulalongkorn University, Bangkok 10330, Thailand.

Received for publication. December 15, 1997.
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วัตถุประสงค์ : เพื่อศึกษาสูงชุกของสารก่อมีพิษในอากาศที่ทำให้เกิดการระคาย
ในผู้ป่วยเด็ก ที่เป็นโรคภูมิแพ้

รูปแบบการวิจัย : การศึกษาจากข้อมูลย้อนหลัง

สถานที่ : คลินิกปุ๋ย wi سكو ภูมิแพ้ ภาควิชาภูมิแพ้ จุฬาลงกรณ์
มหาวิทยาลัย

ตัวอย่างประชากร : ผู้ป่วยเด็กโรคภูมิแพ้จำนวน 305 คน อายุระหว่าง 6-15 ปี ที่มีอาการ
ป่วยเป็นครั้งสูงสุดของโรคคัดจมูก, หรือโรคภูมิแพ้ที่เริ่มต้นจาก
ภูมิแพ้ ซึ่งได้รับการกระทำตอบแทนสารภูมิแพ้ในอากาศ
ที่พบอยู่จากนัก 10 ชนิด ในระหว่างเดือน มกราคม 2535 จนถึง
เดือน มิถุนายน 2540

ผลการศึกษา : มีผู้ป่วยเด็กหญิง 100 คน เด็กชาย 205 คน อายุเฉลี่ย 8.9 ± 2.1 ปี
ร้อยละ 57.37 เป็นโรคคัดจมูก, ร้อยละ 26.9 เป็นโรคคัดจมูกก่อปฏิกิริยา
จากภูมิแพ้ และร้อยละ 15.73 มีอาการของทั้ง 2 โรค ร้อยละ 85.8 ให้
ประสิทธิ์ได้ภูมิแพ้ในครอบครัว การทดสอบที่ให้ผู้ป่วยต่อสารภู
ภูมิแพ้เป็นน้อย 1 ตัว ร้อยละ 98.04 ซึ่งความชุกของการระคาย
จากสารภูมิแพ้ในอากาศที่พบอยู่มีสัดส่วน คือ ตัวไวต่อ ร้อยละ 92.13,
ภูมิแพ้ร้อยละ 89.18, ขาดแคลนสถาปัตย์ ร้อยละ 53.77, ต่ำภูมิแพ้ ร้อยละ
53.11, ทนภูมิแพ้ ร้อยละ 51.15, ผู้ที่ ร้อยละ 42.62, เขียว ร้อยละ 35.08,
ภูมิแพ้ร้อยละ 34.09, รังสีสุนัข ร้อยละ 27.87 และรังสีแมว
ร้อยละ 13.77

วิจารณ์และสรุป : จากการศึกษาพบว่า สารภูมิแพ้ในบรรยากาศยังเป็นปัจจัยสำคัญ
ในการก่อโรคภูมิแพ้ทางระบบทางเดินหายใจ และที่สำคัญ 2 ตัว คือ
ร่างกายและผู้ป่วย ซึ่งเป็นปัจจัยสำคัญในการรักษาผู้ป่วยจากอาการไข้
แล้วนั้น การให้การศึกษาและแนะนำการป้องกันโรคภูมิแพ้ในการหลีกเลี่ยงและ
ป้องกันสารภูมิแพ้ที่พบอยู่ในอากาศเพื่อลดการระคายภูมิในวัยเด็ก โดย
เฉพาะในครอบครัวที่มีประวัติภูมิแพ้ จะทำให้ผู้ป่วยมีการเกิดโรคภูมิแพ้
ตลอดตัว
Asthma and allergic rhinitis is increasing in frequency and severity, particularly among children and young adults, and has a higher prevalence in males. Asthma is also a leading cause for treatment in emergency departments, and school absenteeism among children. Newly released treatment guidelines highlight the use of anti-inflammatory agents to reduce airway inflammation. To further reduce the burden of asthma, greater emphasis will need to be placed on prevention. One aspect of prevention involves identifying and avoiding environmental exposures to aeroallergens. 75–85 per cent of asthmatic patients have positive immediate skin test reactions to common inhalant allergens\(^1\), and severity is also correlated with the number of positive immediate skin tests\(^2\). Skin testing provides a definite diagnosis of allergic sensitization. It is very easy, convenient, not expensive and rapid. Knowing the prevalence of allergic sensitization to common allergens is beneficial for better treatment planning and controlling of allergic diseases.

**Objectives**

- To study the prevalence of sensitization to various common aeroallergens in allergic Thai children.

**Materials and Methods**

305 allergic children attending the Allergy Clinic of the Department of Pediatrics, Faculty of Medicine, Chulalongkorn Hospital University, Bangkok, Thailand between January 1992 and June 1997 were recruited into the study. All patients had moderate to severe symptoms of chronic wheeze and/or chronic rhinitis with nasal obstruction.

The diagnosis of asthma was defined as reversible airway obstruction with at least 20 percent reversibility of FE\(_V_1\), or PEFR on post bronchodilator testing or more than 6 asthmatic attacks in the past and a positive family history of atopy and/or associated atopic diseases. Allergic rhinitis was defined as chronic watery rhinitis with nasal obstruction and itching experienced for at least one year. Physical findings show pale and swollen inferior turbinates with eosinophilia on nasal smears. For at least one week prior to testing, all of our patients had stopped all antihistaminic drugs that might interfere with the result of skin test.

Intradermal skin tests were performed on the inner side of the forearm with 0.02 ml of allergen extract. An insulin syringe with needle sizes of 27 was used. The 10 allergenic extracts (Center Laboratories, Port Washington, U.S.A) with 1:1,000 concentrations included house dust, feathers, kapok, mixed mold, mixed grass, dog, cat, cockroach, acacia and mixed mite as well as histamine 1:1,000 and saline control. Reactions were read at 20 minutes, and the wheal was measured in two dimensions. A positive reaction was considered to be a wheal 5 mm. larger than that of the negative control. All skin
tests were performed by the same technician and read by the same physician.

Statistics - Descriptive analysis

Results

The demographics of the patients studied were presented in Table I. A total of 305 patients aged 6 to 15 years were evaluated in the allergy clinic and these patients had a mean age of 8.9 years with a 2.05:1 male to female ratio. Of all 305 subjects, 175 (57.37%) had asthma, 82 (26.9%) had allergic rhinitis and 48 (15.73%) had asthma and allergic rhinitis. 85.8% had positive family history of atopy. (Table 1)

<table>
<thead>
<tr>
<th>Number of patients</th>
<th>age (yr)</th>
<th>male (no)</th>
<th>female (no)</th>
<th>asthma (no)</th>
<th>allergic rhinitis (no)</th>
<th>asthma &amp; allergic rhinitis (no)</th>
</tr>
</thead>
<tbody>
<tr>
<td>305</td>
<td>8.9 ± 2.1</td>
<td>205</td>
<td>100</td>
<td>175</td>
<td>82</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(57.37%)</td>
<td>(26.9%)</td>
<td>(15.73%)</td>
</tr>
</tbody>
</table>

At least one skin test was demonstrated in 299 children (98.04%). The other six patients that were negative, had not an allergic cause. The prevalence of sensitization to various allergens was as follows (Table 2), mite mixture 92.13%, house dust 89.18% cockroach 53.77%, mixed grass 53.11%, feathers 51.15%, kapok 42.62%, mixed mold 35.08%, acacia 34.09%, dog 27.87% and cat 13.77%. The prevalence of monosensitization was 17 per cent and polysensitization was 81 per cent. The major allergen causing monosensitization was house dust mites and for polysensitization were house dust mites and house dust.
Table 2. Prevalence of positive skin test for each allergen.

<table>
<thead>
<tr>
<th>Allergen</th>
<th>positive skin test number</th>
<th>percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mite mixture</td>
<td>281</td>
<td>92.13</td>
</tr>
<tr>
<td>House dust</td>
<td>272</td>
<td>89.18</td>
</tr>
<tr>
<td>Cockroach</td>
<td>164</td>
<td>53.77</td>
</tr>
<tr>
<td>Mixed grass</td>
<td>162</td>
<td>53.11</td>
</tr>
<tr>
<td>Feather</td>
<td>156</td>
<td>51.15</td>
</tr>
<tr>
<td>Kapok</td>
<td>130</td>
<td>42.62</td>
</tr>
<tr>
<td>Mixed mold</td>
<td>107</td>
<td>35.08</td>
</tr>
<tr>
<td>Acacia</td>
<td>104</td>
<td>34.09</td>
</tr>
<tr>
<td>Dog</td>
<td>85</td>
<td>27.87</td>
</tr>
<tr>
<td>Cat</td>
<td>42</td>
<td>13.77</td>
</tr>
</tbody>
</table>

Discussion

In the Pediatric Allergy Clinic of Chulalongkorn Hospital University we used intradermal skin testing instead of the prick skin test. This was because the prick skin test had more technical error\(^5\), and less sensitivity and reproducability\(^6\) than intradermal testing. Also, we had only aqueous allergen extracts for use with intradermal skin tests and immunotherapy, so that saved on costs.

In this study group, males numbered about twice the females, as in the previous study.\(^7\) The prevalence of atopy defined by at least one positive skin test was 98.04 per cent and that is higher than in any other reports from Thailand.\(^8\-12\) It could be due to selection of patients that had moderate to severe symptoms which had received some medical treatments but didn't response well to that treatment. Therefore, this skin testing was to emphasize to the parents the need for environmental controls and to obtain immunotherapy in cases of failed medical treatment and uncontrollable environments. However, when we compared our results to previous studies of common aeroallergens in Thailand in the past 20 years (Table 3), house dust and mite causes were found to have doubled from about 40-50 percent to 90 percent. This may be because the climate in Thailand is hot and humid and encourages the proliferation of mites. They were the most common potential indoor allergens which cause asthma worldwide.\(^13\-14\) The most prevalent mite species in Thailand is Dermatophagoides pteronyssinus.\(^15\) Two
studies in Asia from Taipei\textsuperscript{(16)} and Indonesia\textsuperscript{(17)} showed that positive skin tests for house dust and mites were 88\textendash 93\% and 90\textendash 93\%, respectively, and that is close to our study results. Cockroaches were the next most important indoor allergen in Thailand. It rose from 26 percent to 53.77\% in importance in the two studies. It is a problem all over the world, and as reported from the U.S.A\textsuperscript{(18)}, Spain\textsuperscript{(19)} and Taiwan\textsuperscript{(20)}, and they are very difficult to eradicate of cockroaches from the house. Dead cockroaches and/or the excreta may remain in the house for a longer period, depending on the degree of the infestation by cockroaches and the hygienic status of the house.\textsuperscript{(18)} Gelber, et al.,\textsuperscript{(21)} concluded that cockroach hypersensitivity has been recognized as a major risk factor of asthma, particularly among lower socioeconomic groups in crowded multi-family dwellings. Mixed grass is still a significant problem in Thailand but kapok had a prevalence rate which lowered from 77.24\% to 42.62\% due to the use of synthetic materials for bedding. Feathers were studied in this paper because some patients had a history of exposure to feathers due to their parents’ occupations and the result was positive reactions of about 50 percent. That was higher than our expectation, and might be due to birds around the houses. Mixed mold was a bit decreased. Animal danders (dog, cat) had lower prevalences as compared to western countries\textsuperscript{(9)}, and this may be due to different life style, and most of the Thai parents

\begin{table}
\centering
\caption{Comparison of the allergen skin tests from the other studies in Thailand.}
\begin{tabular}{|l|c|c|c|c|c|c|}
\hline
 & (n = 305) & (n = 521) & (n = 100) & (n = 312) & (n = 350) & (n = 68) \\
\hline
- Mite & 92.13 & 73 & 67 & 87.17 & 61.43 & 40.12 \\
- House dust & 89.18 & 75 & - & 95.19 & 74.86 & 54.4 \\
- Cockroach & 53.77 & 18 & 44 & - & 46 & 26.47 \\
- Mixed grass & 53.11 & 50 & 14 & 59.61 & 48.86 & 22.06 \\
- Feather & 51.15 & - & - & - & - & - \\
- Kopok & 42.62 & 41 & - & 77.24 & 16.29 & 22.06 \\
- Mixed mold & 35.08 & 55 & 7 & 52.56 & 54.57 & - \\
- Dog & 27.87 & - & 5 & - & - & - \\
- Cat & 13.77 & - & 10 & - & - & 13.24 \\
+ ve at least & 98.04 & 87 & 74 & - & 93.7 & 72.06 \\
\hline
\end{tabular}
\end{table}
had some experience with animal danders. Other factors that lead to low exposure to animal danders are that Thai residents usually do not keep pets in the house and the climate is not as cold as in western countries.

Intradermal skin testing is not a routine laboratory screening procedure diagnosis for allergic diseases. But knowing the prevalence of common aeroallergens in Thailand is helpful for education of the parents. In addition to genetic factors, exposure in early childhood to house mites and other allergens is important for the clinical expression of asthma.(2)

Conclusions

Our data supports that mites and house dust are the most important aeroallergens among allergic Thai children. Cockroaches are the next major cause of allergic problems here. Therapeutic efforts should be focused on education of the parents about relevant allergens and advising about techniques for reducing exposure, especially in early childhood, in families with a positive history of atopy.

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