Allergen Skin Test Reactivities Among Asthmatic Thai Children†

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Abstract

Skin prick tests with 14 selected local aeroallergens were performed on 100 asthmatic children aged 0-16 years attending the Pediatric Allergy Clinic, Faculty of Medicine, Siriraj Hospital. The 14 allergens included *Dermatophagoides farinae, Dermatophagoides pteronyssinus*, American cockroach *(Periplaneta americana)*, Johnson grass *(Sorghum halopense), Cladosporium clarosporoides, Alternaria tenuis, Penicillium* mix, *Aspergillus* mix, cat dander, dog dander, milk, egg white, soy and shrimp. Positive skin test reactivity was defined as a mean wheal diameter $\geq$ 3 mm at the 20 minute reading. There were 68 males and 32 females. Their ages were between 0-2 years (n=1), 2-5 years (n=19), 5-10 years (n=49) and 10-16 years (n=31). Of all the subjects, 22 were classified as having mild asthma, 74 with moderate asthma and 4 with severe asthma. At least one skin prick test was positive in 74 subjects (74%) and two positive tests in 66 subjects (66%). The prevalence of sensitization to various allergens was as follows; *Dermatophagoides pteronyssinus* 67%, *Dermatophagoides farinae* 62%, American cockroach 44%, shrimp 14%, Johnson grass 14%, cat dander 10%, *Alternaria* 7%, *Cladosporium* 7%, dog dander 5%, soy 4%, *Penicillium* 3%, *Aspergillus* 2%, milk 2% and egg white 1%. The wheal size to *Dermatophagoides pteronyssinus* did not correlate with age. In this group of asthmatic Thai children, house dust mites are the most important allergen causing sensitization.

Atopy has been found to be the most important risk factor in the development of asthma[1]. It has been reported that 75-85 per cent of patients with asthma have positive immediate skin test reaction to common inhalant allergens[2,3]. Severity of asthma in childhood also correlates, with the number of positive immediate skin tests[4,5]. These data suggest that knowledge of pattern of allergic sensitization is beneficial in both diagnosis and treatment of asthma. Knowing the prevalences of

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sensitization to various allergens in each locality is essential for better treatment planning and controlling of allergic diseases and asthma. The objective of this report is to study the prevalences of sensitization to various common allergens in randomly selected asthmatic Thai children.

MATERIAL AND METHOD

Patients : 100 asthmatic children attending the Allergy Clinic, Department of Pediatrics, Faculty of Medicine, Siriraj Hospital, Mahidol University, Bangkok, Thailand between December 1994 and June 1995 were recruited into the study. History and severity of disease was recorded by attending pediatric allergists. Classification of severity of asthma was performed following the guideline published by the National Heart, Lung and Blood Institute[6].

The diagnosis of asthma was defined as reversible airway obstruction with at least 20 per cent reversibility by FEV_1 or PEF on post bronchodilator testing or more than 3-4 asthmatic attacks in the past and with positive family history of atopy and/or associated atopic diseases. Antihistamines or other medications that would interfere with results of skin test were withheld for 1 week prior to the skin testing time.

Skin testing : Epicutaneous skin tests were performed on the upper backs by pricking through a drop of extracts with straight needle utilizing 14 allergenic extracts (Center laboratories, Port Washington U.S.A.) with concentrations as follows; *Dermatophagoides farinae* (Df) 10,000 AU/ml, *Dermatophagoides pteronyssinus* (Dp) 10,000 AU/ml, American cockroach *(Periplaneta americana)* 1:10 wt/vol, Johnson grass *(Sorghum halo-*

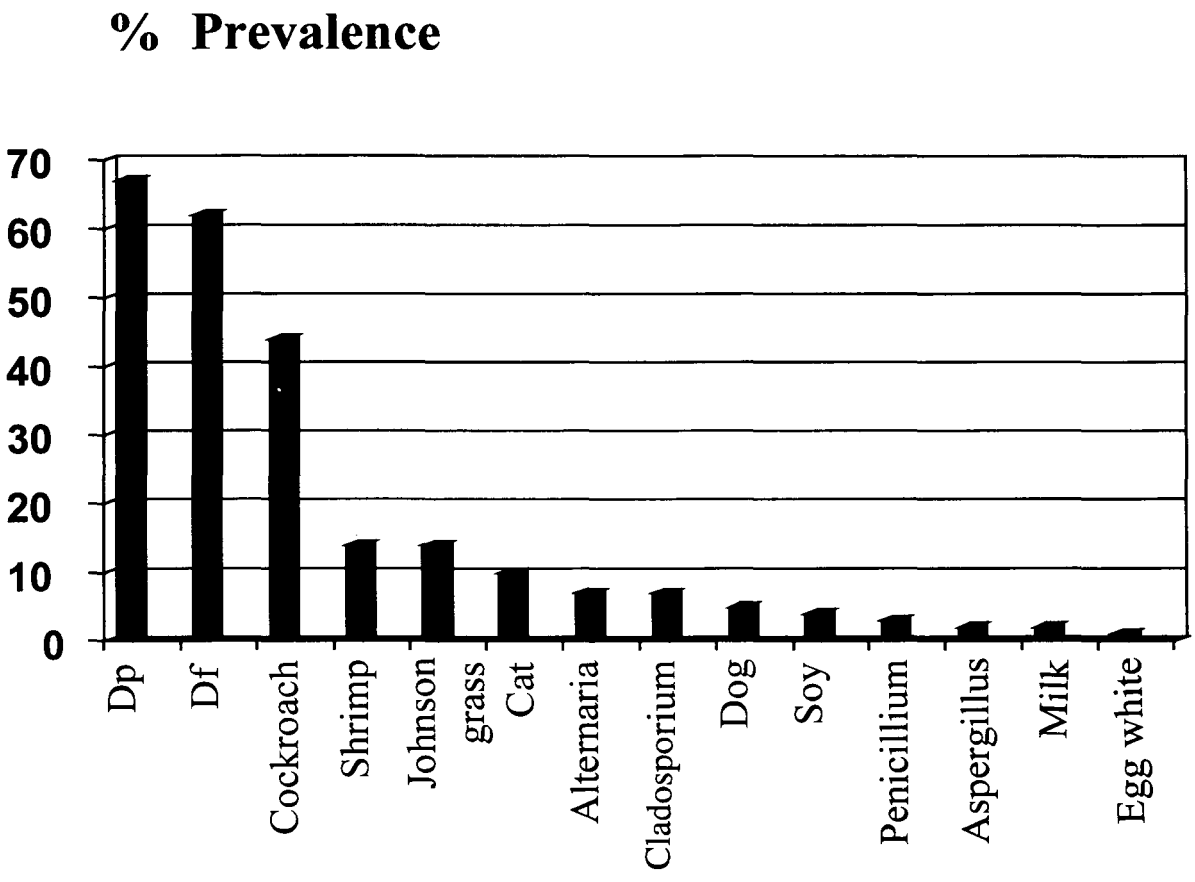

Fig. 1. Prevalences of positive skin prick test to various allergens among asthmatic Thai children. (Dp = *Dermatophagoides pteronyssinus*, Df = *Dermatophagoides farinae*.)

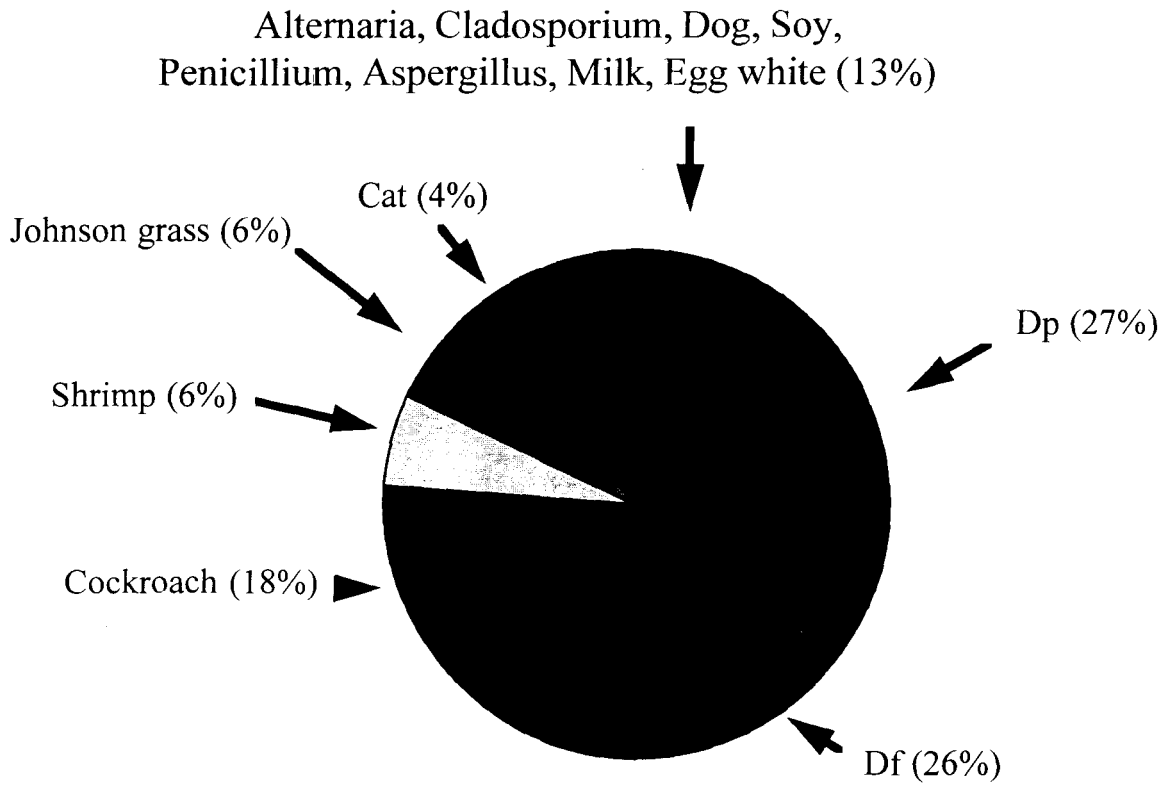

Fig. 2. Rate of positive skin test to various allergens as percentages to all positive skin tests. (Dp = Dermatophagoides pteronyssinus, Df = Dermatophagoides farinae.)

pense) 1:10 wt/vol, *Cladosporium clarosporoides* 1:10 wt/vol, *Alternaria tenuis* 1:10 wt/vol, *Penicillium* mix 1:10 wt/vol, cat dander 1:10 wt/vol, dog dander 1:10 wt/vol, *Aspergillus* mix 1:10 wt/vol, milk 1:20 wt/vol, egg white 1:20 wt/vol, soy 1:20 wt/vol, and shrimp 1:20 wt/vol.

Distance between each drop of allergenic extract was at least 4 cm. In addition to the allergenic extracts described, glycerinated histamine (10 mg/ml) and saline controls were used. Wheal sizes (means of the 2 longest orthogonal dimensions) were determined at 8-10 minutes for histamine and 15-20 minutes for allergens. A wheal of 3 millimeters or greater was considered a positive skin reaction.

Statistics : Descriptive statistics for data obtained from asthmatics were analysed for each allergen i.e. per cent positives for each allergen, age distribution of those with positive skin tests and wheal sizes of each allergen. Association between wheal sizes and age was determined by appropriate regression analysis.

RESULTS

There were 68 males and 32 females recruited into the study. The ratio between male and female was 2.1:1. Their ages were between 0-2 years (n=1), 2-5 years (n=19), 5-10 years (n=49) and 10-16 years (n=31). Of all the subjects, 22 were classified as having mild asthma, 74 with

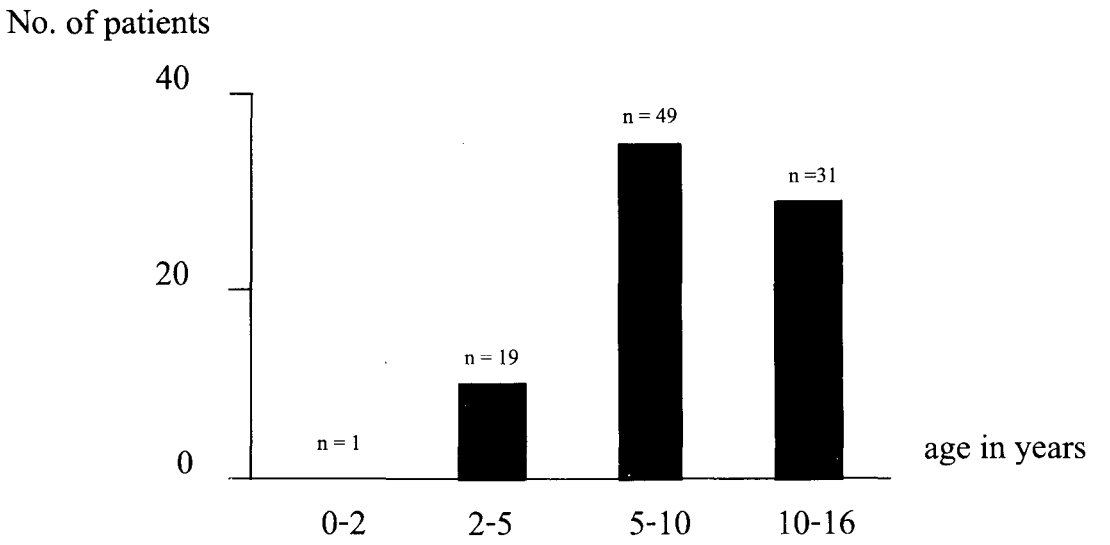

Fig. 3. Prevalence of one or more positive skin tests in each age group of patients. (n= total number of patients in each age group)

moderate asthma and 4 with severe asthma. At least one skin prick test was positive in 74 subjects (74%) and two positive tests in 66 subjects (66%). The prevalence of sensitization to various allergens was as follows (Fig. 1); *Dermatophagoides pteronyssinus* 67 per cent, *Dermatophagoides farinae* 62 per cent, American cockroach 44 per cent, shrimp 14 per cent, Johnson grass 14 per cent, cat dander 10 per cent, *Alternaria* 7 per cent, *Cladosporium* 7 per cent, dog dander 5 per cent, soy 4 per cent, *Penicillium* 3 per cent, *Aspergillus* 2 per cent, milk 2 per cent and egg white 1 per cent. Of all the allergens tested, *Dermatophagoides pteronyssinus* was found to be the most prevalent allergen eliciting positive skin tests (Fig. 2). The second most prevalent allergen was *Dermatophagoides farinae*. Almost all patients who had skin prick test positive to *Dermatophagoides pteronyssinus* also had skin prick test positive to *Dermatophagoides farinae* (60 patients). Only 7 patients had skin prick test positive only to *Dermatophagoides pteronyssinus* and 2 patients had skin prick test positive only to *Dermatophagoides farinae*. The prevalence of monosensitization was 20 per cent and polysensitization was 54 per cent. The major allergens causing monosensitization were house dust mites and major allergens for polysensitization were house dust mites and cockroach. The prevalence of positive skin testing to at least one allergen in each age group is shown in Fig. 3. The mean wheal sizes to *Dermatophagoides pteronyssinus* were not found to correlate with age as shown in Fig. 4.

DISCUSSION

In this group of randomly recruited patients, asthma affected males about twice more than females which is in agreement with previous observation[7]. The most prevalent age group among our patients was between 5-10 years with only 1 subject included for the 0-2 years age group. This could be due to a difficulty in diagnosing asthma in a younger age group. The prevalence of atopy in this group of asthmatics, defined by at least one positive skin prick test, was 74 per cent, a frequency similar to those reported from other countries[2,3]. The most common allergens sensitized by this group of children were house dust mites followed by cockroach which was also similar to findings from other South East Asian countries indicating that house dust mites are the most important allergens for this part of the world[8].

Mites proliferate well in hot and humid climate of Thailand. They are the most common potential indoor allergens and a major cause of asthma worldwide[9,10]. The most prevalent mite

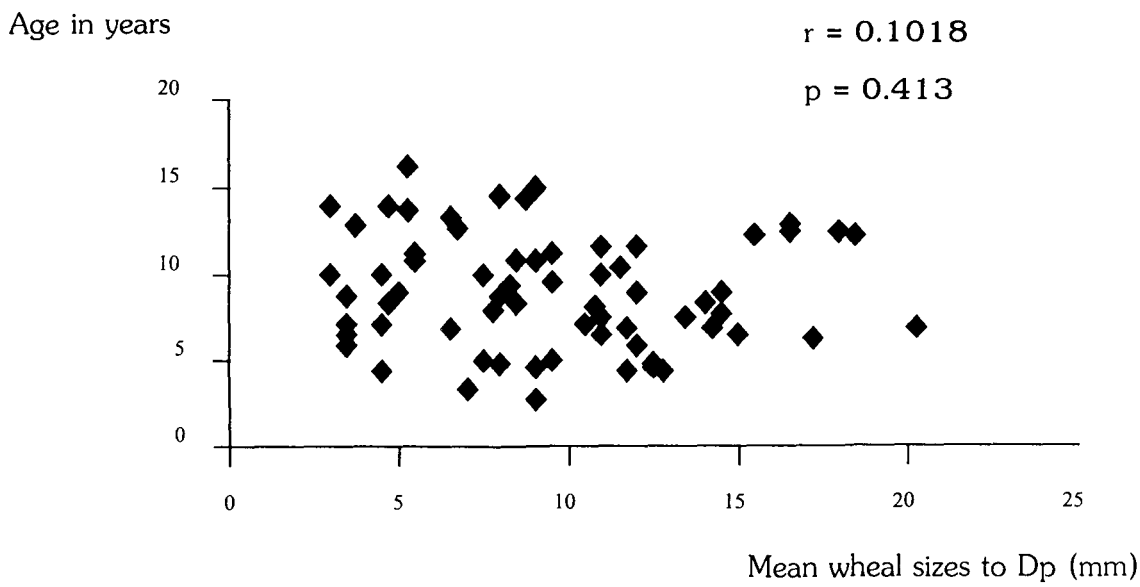

Fig. 4. No correlation between mean wheal sizes to *Dermatophagoides pteronyssinus* with age of patients was demonstrated (r = 0.1018, p = 0.413).

species in Thailand is Dermatophagoides pteronyssinus[11]. Almost all patients who were sensitized to *Dermatophagoides pteronyssinus* were also sensitized to *Dermatophagoides farinae*. This was perhaps due to cross reaction among the two species. Two patients had skin prick test positive to *Dermatophagoides farinae* alone. Cockroach was the next most important indoor allergen in Thailand. The most common species is American cockroach[12]. The prevalence of atopy to cockroach in this study was 44 per cent which was approximately the same as the rates reported in previous studies from U.S.A. and Taiwan[13,14]. Cockroach hypersensitivity has been recognized as a major risk factor for asthma, particularly among lower socioeconomic groups[15]. Other allergens sensitized with low prevalences as compared to Western countries were pollens and animal danders. This may be due to different life style and environment. No ragweed has been observed in Thailand and grass pollens in this country sporulate in low density gradually all of the year round[16]. It is not customary for Thai to keep pets in houses. These factors could lead to low exposure to animal danders among residents of Thailand. Patients in this study demonstrated low prevalence of sensitization to foodstuffs.

Previous study of asthmatic children from this country have shown prevalence of positive skin test to be 93.6 per cent with house dust being the most commonly sensitized allergen followed by animal danders and house dust mites[17]. The reason for the discrepancy of findings in this previous report and in our study is unclear. In the former study, both skin prick test and intradermal test were utilized and nonstandardized mite antigens were used. In contrast, we only employed skin prick test with standardized mite extracts which are more potent extract. Mean wheal sizes to Dermatophagoides pteronyssinus in our study did not correlate with age.

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การทดสอบภูมิแพ้ทางผิวหนังในเด็กไทยที่เป็นหอบหืด†

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ผู้ศึกษาได้ทำการทดสอบภูมิแพ้ทางผิวหนังโดยวิธีสะกิดในคนไข้หอบหืดซึ่งมีอายุไม่เกิน 16 ปี ที่มาตรวจที่หน่วยภูมิแพ้ ภาควิชากุมารเวชศาสตร์ โรงพยาบาลศิริราช ด้วยน้ำยาทดสอบภูมิแพ้ 14 ชนิด ได้แก่ Dermatophagoides farinae, Dermatophagoides pteronyssinus, American cockroach (Periplaneta americana), หญ้าพง (Sorghum halopense), Cladosporium clarosporoides, Alternaria tenuis, Penicillium mix, Aspergillus mix, รังแคแมว, รังแคสุนัข, นม, ไข่ขาว, ถั่วเหลือง, และกุ้ง การทดสอบที่ให้ผลบวกหมายถึง มีตุ่มนูนที่มีขนาดเส้นผ่าศูนย์กลาง ≥ 3 มม. หลังการสะกิดเป็นเวลา 20 นาที ผลการศึกษาพบว่ามีคนไข้ชาย 68 ราย หญิง 32 ราย อายุระหว่าง 0–2 ปี จำนวน 1 ราย 2–5 ปี จำนวน 19 ราย 5–10 ปี จำนวน 49 ราย และ 10–16 ปี จำนวน 31 ราย เมื่อแบ่งตามความรุนแรงของโรคพบว่า รุนแรงน้อย 22 ราย รุนแรงปานกลาง 74 ราย และรุนแรงมาก 4 ราย คนไข้ที่ให้ผลการทดสอบบวกต่อน้ำยาทดสอบภูมิแพ้อย่างน้อย 1 ชนิด มีจำนวน 74 ราย (74%) และให้ผลบวกต่อน้ำยาทดสอบภูมิแพ้อย่างน้อย 2 ชนิดมี จำนวน 66 ราย (66%) อัตราการทดสอบที่ให้ผลบวกต่อ Allegen ต่าง ๆ มีดังนี้ Dermatophagoides pteronyssinus 67%, Dermatophagoides farinae 62%, American cockroach 44%, กุ้ง 14%, หญ้าพง 14%, รังแคแมว 10%, Alternaria 7%, Cladosporium 7%, รังแคสุนัข 5%, ถั่วเหลือง 4%, Penicillium 3%, Aspergillus 2%, นม 2%, และไข่ขาว 1% ขนาดของตุ่มนูนของ Dermatophagoides pteronyssinus ไม่มีความสัมพันธ์กับอายุของคนไข้

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