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Prevalence and severity of allergic diseases in Thai children in Phitsanuloke Province

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Backgrounds : *The number of Thai children affected by allergic diseases is increasing. However the studies regarding their prevalence, severity, risk factors and treatments have not yet been systematically performed.*

Objectives : *To study the prevalence, severity, and risk factors of allergic diseases in children.*

Materials and Methods : *We conducted a cross-sectional descriptive study. Grade 1 - 6 students (aged between 6 - 11.9 years old) at Jakanboon School and grade 7-12 students (aged between 12 -18 years old) at Janokrong School in Phitsanuloke were recruited. The modified ISAAC questionnaire (International Study Asthma and Allergy in Children) was used for data collection. The association of risk factors and allergic diseases was analyzed by binary logistic regression model.*

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Results : *The questionnaire of 3,164 students were evaluated (response rate 60.3%). There were 36.3% of students aged between 6 - 11.9 years and 63.7% of students aged between 12 to18 years old with the mean age of 9.67 ± 1.60 years old and 15.27 ± 1.69 years old, respectively. The prevalence of allergic rhinitis (AR), asthma, allergic conjunctivitis (AC), atopic dermatitis (AD), urticaria, food allergy and drug allergy were 47.9%, 5.5%, 29.5%, 21.2%, 22.2%, 9.8%, and 1.0% respectively. In AR, the frequency of persistent AR was 56.0% while the frequency of intranasal corticosteroid use was only 1.3%. In asthma, mild intermittent asthma was the most common (43.9%). The admission rate was 13.3%. The mean occurrence of exercise-induced bronchospasm and asthma in the past year was 49.1% and 67.6%, respectively. The mean inhaled corticosteroid use was 7.9%.*

The coexisting conditions, asthma and AR were found in 7.7% and 65.5% of AD patients, respectively. Similarly, asthma and AC were found in 9.6% and 55.6% of AR patients. Positive family history of atopic diseases was significantly associated with all allergic diseases in both age groups. In addition, exposure to cigarette smoke was associated with AR in both groups. However, exposure to cigarette smoke was significantly associated with asthma only in the young age group.

Conclusion : *The prevalence of allergic diseases in Thai children in Phitsanuloke was still high. There were a high percentage of patients with severe symptoms as assessed by rate of admission and asthmatic attack. The intranasal and inhaled corticosteroids were rarely used. Family history of atopic disease and exposure to cigarette smoke were associated with allergic diseases.*

Keywords : *Prevalence, Allergy, Risk, Children.*

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ความเป็นมา : *โรคภูมิแพ้เป็นโรคที่พบบ่อยมากขึ้นในสังคมปัจจุบัน จากการศึกษาทั่วโลกก็พบว่าอัตราความชุกของโรคภูมิแพ้ได้เพิ่มขึ้นอย่างรวดเร็ว และยังไม่มีการศึกษาเกี่ยวกับความชุก และความรุนแรงในเด็กไทยในจังหวัดพิษณุโลกมาก่อน*

วัตถุประสงค์ : *เพื่อศึกษาหาความชุก ความรุนแรงของโรคภูมิแพ้แต่ละชนิด รวมถึงหาความสัมพันธ์ของโรคภูมิแพ้ และปัจจัยต่างๆ ในเด็กนักเรียนชั้นประถมศึกษา และชั้นมัธยมศึกษาในจังหวัดพิษณุโลก*

วิธีการศึกษา : *ใช้แบบสอบถามความชุกและความรุนแรงของโรคภูมิแพ้เด็กนักเรียนชั้นประถมศึกษาปีที่ 1-6 โรงเรียนจ่าการบุญ และมัธยมศึกษาปีที่ 1-6 โรงเรียนจ่านกร้องจังหวัดพิษณุโลก โดยให้เด็กและผู้ปกครองเป็นผู้ตอบแบบสอบถาม เก็บข้อมูลพื้นฐาน อาการและการรักษา โดยข้อมูลทั้งหมดจะได้รับการบันทึกลงในแบบฟอร์ม (ภาคผนวก) และนำมาวิเคราะห์และหาความสัมพันธ์ระหว่างปัจจัยที่อาจมีผลกับการเกิดโรคภูมิแพ้ต่างๆ โดยวิธี Binary logistic regression analysis*

ผลการศึกษา : *จากการศึกษาความชุกของโรคภูมิแพ้โดยการใช้แบบสอบถามในประชากรเด็กเล็ก (อายุ 6 - 12 ปี) และเด็กโต (อายุ 12 - 18 ปี) ในจังหวัดพิษณุโลกจำนวน 3,164 ราย พบว่าความชุกของ allergic rhinitis (AR) ร้อยละ 47.9, asthma ร้อยละ 5.5, allergic conjunctivitis (AC) ร้อยละ 29.5, atopic dermatitis (AD) ร้อยละ 21.2, urticaria ร้อยละ 22.2, food allergy ร้อยละ 9.8 และ drug allergy ร้อยละ 1.0 ความรุนแรงที่พบใน AR ได้แก่ persistent symptom ร้อยละ 56.0, มีการใช้ยา intranasal steroid ร้อยละ 1.3, พบ exercise-induced bronchospasm ใน asthma ร้อยละ 49.1, มีอาการหอบใน 1 ปีที่ผ่านมา ร้อยละ 67.6, ระดับความรุนแรงที่พบบ่อยเป็น intermittent asthma ร้อยละ 43.9, ต้องนอนโรงพยาบาล เพื่อรับการรักษาใน 1 ปีที่ผ่านมา ร้อยละ 13.3, มีการใช้ inhaled corticosteroid ร้อยละ 7.9 โรคภูมิแพ้ที่พบร่วมกัน พบว่าเด็กที่เป็น AR จะมี asthma ร่วมด้วยร้อยละ 9.6 และมี AC ร่วมด้วย ร้อยละ 55.6 สำหรับปัจจัยที่มีความสัมพันธ์กับการเกิดโรคภูมิแพ้ พบว่าประวัติภูมิแพ้ในครอบครัวมีความสัมพันธ์อย่างมีนัยสำคัญในทุกโรคในทั้ง 2 กลุ่ม ส่วนประวัติการสูบบุหรี่ในครอบครัว พบความสัมพันธ์กับโรคหอบหืดในเด็กเล็กเท่านั้น แต่กับ AR ประวัติการสูบบุหรี่มีความสัมพันธ์ในเด็กทั้งสองกลุ่ม*

บทสรุป : *จากการศึกษานี้ ทำให้ทราบถึงความชุก ความรุนแรง และการรักษาโรคภูมิแพ้ในเด็กไทยที่จังหวัดพิษณุโลก รวมถึงความสัมพันธ์ของปัจจัยที่อาจมีผลกับการเกิดโรคภูมิแพ้ชนิดต่างๆ อันได้แก่ ประวัติการมีโรคภูมิแพ้ และการมีคนสูบบุหรี่ในครอบครัว และการรักษาที่ผู้ป่วยได้รับในการควบคุมอาการ เช่น intranasal steroid และ inhaled corticosteroid ซึ่งยังมีการใช้กันน้อยมาก*

คำสำคัญ : *ความชุก ความรุนแรง โรคภูมิแพ้ในเด็ก.*

Allergic diseases are chronic illnesses with a significant impact on people's quality of life. The prevalence of allergic diseases continues to grow reflecting both increased exposures and enhanced response to allergens. The number of children with allergic diseases is also increasing worldwide. In Thailand, Vichayanond P, *et al.* studied 7,341 Thai children living in Bangkok with the age between 6 and 14 years olds in 1998 and found that the prevalence of asthma, allergic rhinitis and atopic dermatitis was 13%, 40% and 15.4% respectively.[1] Compared to the results of Boonyarittipong P, *et al.* in 1990[2], the prevalence of asthma and allergic rhinitis significantly increased making allergic diseases one of the most important illnesses affecting Thai children. Another study in Chiangmai in 1999, Trakultivakorn M, *et al.* found the prevalence of allergic diseases in 7,755 of 6 to 7 years old primary school and 13 to14 years old high school students similar to the results in Bangkok.[3]

In Phitsanuloke, a study done by Uthaisangsuk S, *et al.* in 3,538 of 17 to 69 years-old students and medical personnel of Naresuan University using ISSAC questionnaires in 2002 found that the prevalence of asthma, allergic rhinitis and atopic dermatitis was 9.8%, 60% and 16.3% respectively. [4] However, there was no such study in younger age group in this province. We therefore conducted a cross-sectional study to determine the prevalence, disease severity and risk factors of allergic diseases in children.

Materials and Methods

The subjects in this study were 5,245 students from Jakanboon School (between 6 - 11.9 years old) and Janokrong School (between 12 - 18 years old) in Phitsanuloke. The subjects were recruited from September 2006 to February 2007. The modified International Study Asthma and Allergy in Children (ISAAC) questionnaire was used for data collection. The study was approved by local ethics committees.

Results

Of 5,245 questionnaires, 3,164 were received making the response rate 60.3%.

The modified ISSAC questionnaires was distributed to younger children, and 1,330 were completed; of the 2,015 older children invited, completed consent forms and questionnaires were received from 3,164 (60.3%). The responses came from 1,330 male students (523 students from Jakarnboon School and 807 students from Janokrong School) which were 42% and 1,834 female students (626 students from Jakarnboon School and 1,208 students from Janokrong School) which were 58%.)

The data from the two study groups revealed that the mean prevalence of AR, asthma, AC, AD, urticaria, food allergy and drug allergy were 47.9%, 5.5%, 29.5%, 21.2%, 22.2%, 9.8% and 1% respectively (Figure 1).

Children with allergic rhinitis from both groups had similar symptoms which were rhinorrhea (84.4%), itching (76.6%), congestion (73.7%) and sneezing (89.2%). Associated symptoms found in each group were shown in table 1.

Severity of the disease is ranged and it was found that the intermittent symptom was the most frequently found that is 33.7% in younger children and 31.3% in older children (averagely 32.2%), whereas mild persistent was found to be less that is 27.5% in

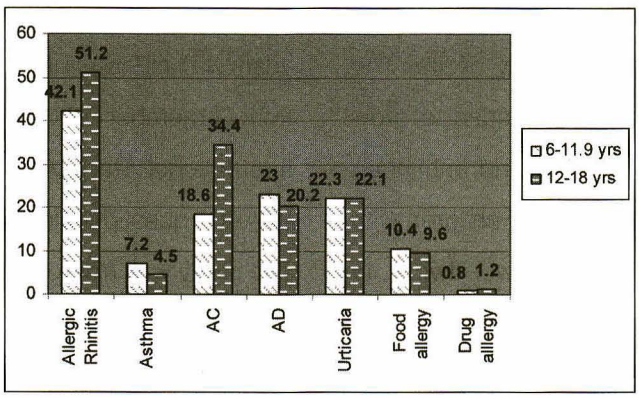

Figure 1. Percentage of prevalence of allergic diseases of students categorized by age.

Table 1. Associated symptoms in children with AR.

QOL	6 -11.9 yrs %	12 - 18 yrs %	Total %
Sleep disturbance	39	38.6	38.6
Frequently ill	24.4	34.4	31.2
Absent from school	12.2	7.3	8.8
Feel annoy	22.5	30.9	28.2

younger children and 33.9% in older children (averagely 31.9%), while the prevalence of highly severe disease is found 8.2%.

There were 49.1% of the patients (65.9% in younger age group and 43.8% in the older ones) who sought for treatment. The most frequently used medicine was the second generation antihistamine (40.3%). The first generation antihistamine, decongestant, intranasal decongestant and oral steroid were used in 29.5%, 16.6%, 3.5% and 0.3% of the patients respectively. Surprisingly, the intranasal steroid was used in only 1.3% of the patients.

Asthma was found in 5.5% of the patients (7.2% in the younger age group and 4.5% in the older one). Regarding the severity of the disease, 43.9% of the patients had mild intermittent asthma (56.6% in the younger age group and 32.2% in the older ones). There were 26.7%, 27.7% and 1.7% of patients suffered with mild, moderate and severe persistent asthma respectively. About 49.1% of children had exercise-induced asthma (37.3% in the younger age group and 60% in the older one). There were 67.6% of the children with history of asthmatic attack during the previous year (71.1% in the younger group and 64.4% in the older one).

Oral bronchodilator was used in 56.4% of children with asthma (63.9% in the younger age group and 43.3% in the older ones) while inhaled bronchodilator and inhaled corticosteroid were used in only 33.7% and 7.9% respectively.

About 15.8% of children with urticaria also developed angioedema (13.3% in the younger age group and 17.1% in the older one). The causing allergens were unknown in 45.5% of children. Interestingly, hot weather was found to be a leading cause in 33% of the children. Around 98.5% of the children did not have symptoms for more than six weeks; 1.5% of them had persistent symptoms.

The prevalence of food allergy was low. The most common cause was seafood which was found in 64.4% of the children with food allergy (66.4% in the younger age group and 63.2% in the older ones). Allergy to eggs and cow's milk allergy were found in 0.9% (0.8% in the younger age group and 1% in the older ones) and 6.4% (4.2% in the younger age group and 7.8% in the older ones) respectively.

The most common symptoms were urticaria and atopic dermatitis. There was no severe symptom such as shock in both groups.

Family history of allergy was found to be associated with the occurrence of all allergic diseases in both groups. Exposure to cigarette smoke was also associated with the occurrence of all allergic diseases in both groups except for asthma and food allergy as shown in Table 2.

Co-disease

Table 3 and Table 4 show main diseases against co-diseases which occur together such as children who suffer from allergic rhinitis also have asthma 13.6% and allergic conjunctiontivitis 37.8% and atopic dermatitis 31%.

Table 2. Possible factors causing allergic diseases.

Disease	Factor	Age 6 – 11.9 yrs.			Age 12 – 18 yrs.		
		P value	Odd ratio	95% Confident interval	P value	Odd ratio	95% Confident interval
Allergic rhinitis	Family history of allergy	<0.001	3.02	2.31-3.96	<0.001	2.04	1.61 – 2.58
	Exposure to cigarette smoke	0.022	1.36	1.04 – 1.79	<0.001	1.79	1.47 – 2.16
Asthma	Family history of allergy	<0.001	4.47	2.82 - 7.02	<0.001	4.03	2.62 – 6.20
	Exposure to cigarette smoke	0.026	1.70	1.06 – 2.72	0.259	1.28	0.83 – 1.98
Allergic conjunctivitis	Family history of allergy	<0.001	1.90	1.39 – 2.60	<0.001	1.90	1.39 – 2.60
	Exposure to cigarette smoke	0.002	1.64	1.19 – 2.25	0.002	1.643	1.19 – 2.25
Atopic dermatitis	Family history of allergy	<0.001	2.41	1.81 – 3.22	<0.001	1.67	1.29 – 2.17
	Exposure to cigarette smoke	<0.001	2.25	1.67 – 3.01	<0.001	1.57	1.25 – 1.96
Urticaria	Family history of allergy	<0.001	2.05	1.52 – 2.75	<0.001	1.75	1.36 – 2.25
	Exposure to cigarette smoke	0.001	1.64	1.21 – 2.22	<0.001	1.50	1.20 - 1.86
	Pets in family	0.114	1.25	0.94 – 1.66	0.003	1.42	1.12 – 1.78
Food allergy	Family history of allergy	<0.001	2.84	1.93 – 4.18	0.001	1.78	1.27 – 2.50

Note: The association is determined by binary logistic regression with P value < 0.05 showing statistical significance.

Table 3. Percentage of comorbid diseases in the younger age group (6 - 11.9 year olds).

Co-dis \ Disease	AR	Asthma	AC	AD	Urticaria	FA
AR		79.5	88.0	60.6	56.3	63.0
Asthma	13.6		15.7	11.7	10.2	16.8
AC	37.8	41.0		35.6	29.7	37.0
AD	31.0	36.1	43.5		48.4	52.1
Urticaria	29.8	31.3	35.2	47.0		58.8
FA	14.0	24.0	20.3	23.4	26.9	

หมายเหตุ Co dis = Comorbid disease
AR = Allergic rhinitis
AD = Atopic dermatitis
AC = Allergic conjunctivitis
FA = Food allergy

Table 4. Percentage of comorbid diseases in the older age group (12-18 year olds).

Co-dis \ Disease	AR	Asthma	AC	AD	Urticaria	FA
AR		87.8	91.1	68.6	62.2	65.8
Asthma	7.7		8.2	5.1	5.4	6.7
AC	16.0	65.6		55.6	51.7	50.8
AD	27.1	23.3	31.7		37.8	52.8
Urticaria	26.8	26.7	32.1	41.4		53.4
FA	12.3	14.4	13.7	25.0	23.2	

Discussion

Our study revealed a high prevalence of allergic diseases in children living in Phitsanuloke as well as a high percentage of children with severe symptoms. The prevalence of allergic rhinitis (AR), asthma, allergic conjunctivitis (AC), atopic dermatitis (AD), urticaria, food allergy and drug allergy was 47.9%, 5.5%, 29.5%, 21.2%, 22.2%, 9.8%, and 1.0% respectively.

Regarding allergy in Thailand, there have been several studies in several areas. In 1990, Boonyarittipong P. *et al.* found the prevalence of asthma was 10.6%.[2] In 1998, the prevalence revealed by the study of ISAAC phase 1 was 10.6%.[5] The study of ISAAC phase 3 in Bangkok and Chiangmai in 2003[3] revealed the prevalence of 11.7% in asthma while the prevalence of atopic dermatitis and allergic rhinitis was 54.2% and 21.2% respectively. In 2005,

Siriworadon N. *et al.*[5] studied the prevalence of allergic diseases in Chonburi, Suratthani and Bureerum provinces and found that the prevalence of allergic rhinitis was 44.8% and that of atopic dermatitis was19.7% which was close to those found in our study.

Regarding the disease severity in AR, inadequate sleep was found in 38.6% of the patients. The most common symptom was sneezing which was found in 89.2%. About 74.5% of the patients had to use some medicine to control the symptoms and 50.9% of the patients bought the medicine by themselves in which the first generation antihistamine was the most popular. As for the patients who visited the doctors, the first and second generation antihistamines were given in 40.3% and 29.5% respectively. In addition, intranasal steroids were used in 1.3% of the patients with persistent allergic rhinitis. Compared to a study in Bangkok[6] by Waciraserichai W. in 2005 and Siriwaradol N. in other provinces, there were 6.4% and 4.3% of the patients respectively, who used intranasal steroids.

Comparing to the study of Christopher et al. in 2003[7] which found the prevalence of mild intermittent asthma being 60.1% in the Asia-Pacific region, our study found 43.9% of children in Phitsanuloke with similar condition. The prevalence of exercise-induced bronchospasm in Asia, Bangkok and Phitsanuloke was 33.1%, 32.3% and 49.1% respectively. About 67.6% of patients in Phitsanuloke had history of asthmatic attack within one year higher than those observed in the previous study (47%). There were 15.3%, 7.6%, and 13.3% of patients studied in Asia-Pacific region, Bangkok and Phitsanuloke respectively, who required admission. Our study also found that 56% of the children in Phitsanuloke had persistent asthma which was higher than those found in the Asia-Pacific region (39.9%) and in Bangkok (25.4%). These findings revealed that children with asthma who lived in Phitsanuloke were likely to have more severe condition.

We also found that family history of allergy was associated with AR, asthma, AC, AD, urticaria and food allergy in both groups. Except for food allergy, these findings were similar to the results from the studies by Wanrak W. and Siriworadol N.

Exposure to cigarette smoke was associated with asthma in the younger age group and also with allergic rhinitis, allergic conjunctivitis, atopic dermatitis and uritcaria in both groups. Having pets in the household was associated with urticaria in the older age group.

In conclusion, our study revealed a high prevalence of allergic diseases in Thai children living in Phitsanuloke and a high percentage of the patients with severe symptom. In addition, the number of patients receiving adequate treatment was still low. The factors associated with allergic diseases such as family history of allergy, exposure to cigarette smoke and having pets in the household were also found. Our findings suggest a possible strategy to reduce the prevalence and severity of the diseases. Primary care providers or pediatricians could make appropriate prevention plan and provide effective treatment for the utmost benefits of the patients. However our study had limitation due to using questionnaires so may be have bias from patients and researcher.

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