

# Prevalence of Asthma, Rhinitis, and Eczema in the University Population of Phitsanulok, Thailand

Suwannee Uthaisangsook

**SUMMARY** Allergic diseases have been increasing around the world. Many studies in Thai children by ISAAC protocol found an increase in the prevalences of asthma, allergic rhinitis and eczema. Nevertheless very few studies in Thai adults have been done. The objective of this study was to evaluate the prevalence of asthma, allergic rhinitis and eczema among Naresuan University students. Two thousand six hundred and ninety-three students (835 males and 1,858 females) completed ISAAC standardized written and video questionnaires. The age range was 17-53 years (mean  $20.0 \pm 3.2$  years) of which 97.2% were less than 30 years old. The prevalences of allergic rhinitis within the past 12 months and allergic rhinitis with concomitant conjunctivitis were 57.4% and 25.6%. The prevalences of wheeze within the past 12 months and of diagnosed asthma were 12.1% and 9.8%. The eczema prevalence within the past 12 months was 15.0%. Subjects with rhinoconjunctivitis had significantly more wheeze within the past 12 months and more asthma than those without rhinoconjunctivitis (25.8% and 20.1% vs. 7.6% and 6.3%;  $p < 0.0001$ ,  $p < 0.0001$ ). The prevalences of wheeze within the past 12 months and asthma in males (14.1%, 11.9%) were significantly higher than in females (11.2%, 8.9%) ( $p = 0.044$  and  $0.018$ , respectively). Similar to a recent study in Bangkok University students, our results showed an increasing trend in allergic diseases in the adult population of Phitsanulok, Northern Thailand, as compared to a study 2 decades ago.

Common allergic diseases such as asthma, allergic rhinitis and atopic dermatitis are important diseases with a socioeconomic impact on the general population causing loss of school and work days.<sup>1</sup> The prevalence of allergic diseases especially asthma has increased worldwide.<sup>2-4</sup> Since 1993 many multicenter studies showed prevalence rates for children and adults around the world differ substantially. The European Community Respiratory Health Survey (ECRHS) which studied 140,000 adults in 22 countries showed a prevalence range for current asthma between 2-11.9%.<sup>5</sup> A high prevalence (>7%) of asthma was found in Australia, New Zealand, United States, Ireland, and the United Kingdom. In children, the most extensive multicenter study was the International Study of Asthma and Allergies in

Childhood (ISAAC). In 1998 the ISAAC Steering Committee reported findings of 463,801 children aged 13 to 14 years (155 centers in 56 countries) and of 257,800 children aged 6 to 7 years (91 centers in 38 countries). The report showed variations in the childhood asthma prevalences throughout the world with ranges from 1.6-36.8% in children aged 13-14 years.<sup>6</sup> The study also showed 12-month prevalences of allergic rhinoconjunctivitis and atopic dermatitis at 1.4-39.7% and 0.3-20.5% in the same age group.<sup>7</sup>

An ISAAC study in Thailand showed preva-

From the Department of Pediatrics, Faculty of Medicine, Naresuan University, Phitsanulok, Thailand.

Correspondence: Suwannee Uthaisangsook

E-mail: suwannee\_u@yahoo.com

lences for asthma, allergic rhinitis and atopic dermatitis in children of 8.8-12.7%, 28.5-38.7%, 8.4-11.8%, respectively.<sup>8-10</sup> On the other hand, published data on Thai adults is limited. One recent study in 1998 in Bangkok University students utilizing ISAAC questionnaires reported prevalences of asthma, rhinoconjunctivitis and atopic eczema of 10.1, 26.3 and 9.4%, respectively<sup>11</sup> which had increased compared to surveys in 1975<sup>12</sup> and 1995.<sup>13</sup> An epidemiologic study in adults living in lower Northern Thailand such as Phitsanulok has not been done yet. Unpublished data from Chiang Mai, upper Northern Thailand, indicated a prevalence of adult allergic rhinitis of 30%. It would be interesting to know whether the prevalence of allergic diseases in Northern Thai adults is the same as in Bangkok University students. The objectives of this study were 1) to determine the prevalence of asthma-related symptoms in the Naresuan University population in Phitsanulok, and 2) to study the prevalences of other related allergic disorders, *i.e.* allergic rhinitis and eczema in the same population utilizing a standardized ISAAC phase I questionnaire.

## MATERIALS AND METHODS

Two thousand six hundred and ninety-three Naresuan University students enrolled in the survey in 2003. The objectives of the study were explained to all participants and informed consent was obtained. All completed both written and video questionnaires. The participation rate among the surveyed students was 95%. Ages ranged from 17-53 years with a mean  $\pm$  SD of  $20.0 \pm 3.2$  years. There were 835 males and 1,858 females with a male to female ratio of 1:2.2. Of the subjects, 55.9% were under 20 years of age, 41.4% were between 20-29 years of age, and 2.8% were over 30 years of age.

The questionnaire, taken from the original international ISAAC phase I questionnaire, consisted of written and video questionnaires. The written questionnaire was translated into the Thai language by a panel of Thai pediatric allergists and was then translated back into English by a separate group of experts to ensure the validity of the translation.<sup>14</sup> This questionnaire was then used in the original ISAAC phase I survey of children in Bangkok, Chiangmai and Khonkaen.<sup>8-10</sup> Subsequently it was utilized in an epidemiological survey of adult Bang-

kok University students.<sup>11</sup> Although the ISAAC questionnaire was designed for children, the questions to determine prevalence of asthma, allergic rhinitis and atopic eczema are similar to those in the ECRHS adult study for the same purpose.<sup>15,16</sup> Moreover it has been shown that there is a strong correlation between the results of ISAAC phase I and ECRHS, denoting that both questionnaires measure the same epidemiologic trends of allergic diseases.<sup>17</sup> The written questionnaire consisted of three, one-page modules designed to determine the prevalence of allergic rhinitis, asthma and atopic eczema. Participants self-answered the written questionnaire, and then subsequently answered the ISAAC video questionnaire [AVQ 3.0, International version<sup>18</sup>]. The video questionnaire comprises five video scenes representing different symptoms of asthma (wheeze at rest, wheeze on exertion, night wheeze, night cough and severe wheeze).

The study was reviewed and approved by the human rights and ethic committee of Naresuan University.

The responses in questionnaire were analyzed utilizing SPSS and EPI-info. To compare age, gender and allergic diseases a 2 x 2 contingency table was used (Chi-square analysis with Yates correction).

## RESULTS

The prevalence of asthma-related symptoms is shown in Table 1. The prevalences of wheeze within the past 12 months and of diagnosed asthma were 12.1% and 9.8%, respectively. Exercise-induced wheeze occurred in 13.4%. Severe wheeze interfering with speech was recorded in 1.8% which was lower than the results of the video questionnaire at 2.4% (Table 2). Night cough occurred in a very high percentage (36%) of participants. Surprisingly, the responses from the video questionnaire were at much lower percentages than those from the written questionnaire; *i.e.* wheeze at rest, exercise-induced wheeze, and night cough were at 4.7, 5.4, and 17.7%, respectively.

The influence of age and gender on the prevalence of wheeze within the past 12 months and on diagnosed asthma was further examined. Among

**Table 1** Prevalence of asthma-related symptoms from the written questionnaire

Asthma-related symptoms	Positive response (%)
Wheeze ever	17.5
Wheeze during the past 12 months	12.1
Exercise-induced wheeze	13.4
Wheezing ≥ 4 attacks in the past 12 months	3.4
Wheeze affecting sleep	4.6
Severe wheeze	1.8
Night cough	36.0
Diagnosed asthma	9.8

**Table 2** Prevalence of asthma-related symptoms from the video questionnaire

Asthma-related symptoms within the past 12 months	Positive response (%)
Wheeze at rest	4.7
Exercise-induced wheeze	5.4
Night wheeze	2.6
Night cough	17.7
Severe wheeze	2.4

**Table 3** Prevalence of rhinitis symptoms

Rhinitis symptoms	Positive response (%)
Nose symptoms, ever	64.1
Nose symptoms, within the past 12 months	57.4
Nose together with eye symptoms	25.6
Symptoms interfere with daily activity	46.9
Diagnosed hay fever	34.3

those less than 20 years, between 20 and 30 years, and over 30 years of age, prevalences of wheeze within 12 months and of diagnosed asthma were 13.0, 11.2, 8.5; and 10.3, 9.1, 12.9%, respectively. There was no statistically significant difference between these age groups ( $p = 0.241$ ;  $p = 0.449$ ).

Wheeze within 12 months and a diagnosis of asthma (14.1 and 11.9%) were found more commonly in male than female participants (11.2 and 8.9%). The differences were statistically significant (wheeze 12 months, OR = 1.29, CI 1.01-1.66,  $p = 0.044$ ; diagnosed asthma, OR = 1.39, CI 1.06-1.81,  $p = 0.018$ ).

The prevalence of nasal symptoms (runny nose, nasal congestion and sneeze without a fever or a cold) was high in this population, *i.e.* 64.1%; with 57.4% reporting symptoms within the last 12 months (Table 3). However when symptoms were limited to those with concomitant eye symptoms, the prevalence decreased to 25.6%. Symptoms interfered with daily activities in 46.9%. The prevalence of diagnosed hay fever (corresponding to the Thai term of “allergic to air”) was 34.3%. The pattern of nasal symptoms was of a perennial type with a peak from October to January (Fig. 1). The effect of rhinoconjunctivitis on asthma prevalence was prominent. Subjects with rhinoconjunctivitis reported wheeze within 12 months and asthma in 25.8% and 20.1% of the cases, whereas 7.6% and 6.3% of those without rhinoconjunctivitis reported the respective symptoms which was significantly different (wheeze 12 months, OR = 4.25, CI 3.33-5.42,  $p < 0.0001$ ; asthma, OR = 3.76, CI 2.88-4.91,  $p < 0.0001$ ). This indicated that the presence of rhinoconjunctivitis increases the risk for asthma.

As there is no equivalent Thai word for ‘eczema’, the word ‘eczema’ was translated to ‘allergic rash’ in Thai, like in previous ISAAC studies.<sup>8-11</sup> This may lead to a surprisingly high response rate in eczema-related symptoms. The positive responses of subjects to lifetime rash, rash within 12 months and diagnosed eczema were 21.1%, 19.0%, and 34.8%, respectively (Table 4). Subjects reported rash localized in the areas characteristic for atopic dermatitis in 15.0% with 7.7% reporting rash interfering with sleep. However, the rash mostly cleared within the last 12 months (14.0%).

**DISCUSSION**

Epidemiologic studies on allergic diseases in Thai adults are rare despite a recent surge in epidemiologic studies in Thai children. Two previous surveys in Mahidol University students in 1975 and 1995 demonstrated an asthma prevalence of 2.4%

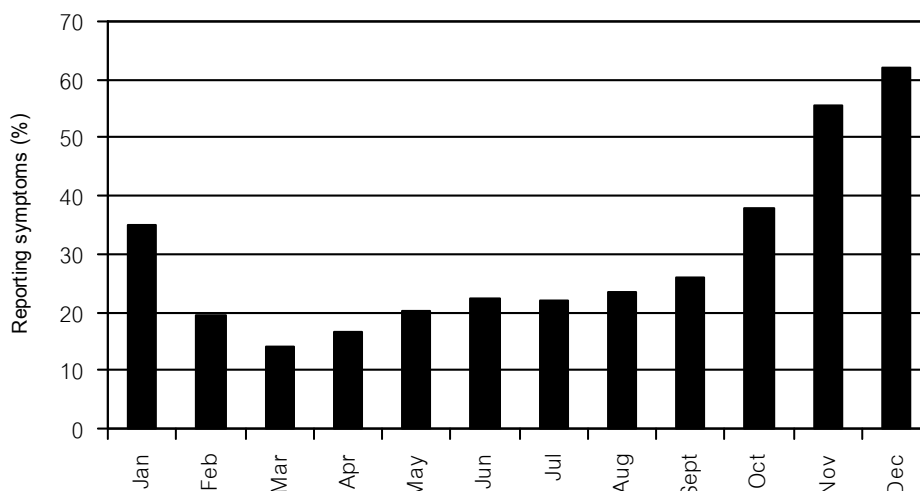


Fig. 1 Percentage of subjects with rhinitis symptoms reported in 2003.

Table 4 Prevalence of eczema-related symptoms

Eczema-related symptoms	Positive response (%)
Rash ever	21.1
Rash, within the past 12 months	19.0
Rash at eczema-specific sites (12 months)	15.0
Rash cleared (12 months)	14.0
Rash interfering with sleep	7.7
Diagnosed eczema	34.8

and 4.8%.<sup>12,13</sup> These surveys were performed by health-science oriented university students, to whom the characteristics of asthma were carefully explained leading to a low response percentage.<sup>11</sup> This study is the second largest study in adults using the ISAAC questionnaire. The first study surveyed Bangkok University students in 1998 finding the prevalences of diagnosed asthma and wheeze in 12 months at 8.8% and 10.1%.<sup>11</sup> The data reflect a higher prevalence of asthma-related symptoms than the Bangkok data. This may indicate an increasing trend of asthma. Moreover our results could indicate that the prevalence of asthma among adults in the inner city of Phitsanulok may be higher than the prevalence of asthma in the Bangkok population, although

the studies were done 5 years apart. It is not known what the asthma prevalence in Phitsanulok was in 1998 which would be a better comparison.

Surprisingly the response rates to wheeze and exercise-induced wheeze in the video questionnaire (4.7% and 5.4%) were much lower than in the written questionnaire. This difference was not found in the previous adult study using the same questionnaire.<sup>11</sup> Despite the high sensitivity and specificity of these two video sequences,<sup>18,19</sup> most ISAAC surveys in different countries also reported lower positive responses to the video questionnaire than to the written one. The explanation may be that the video questionnaire determined more severe symptoms in our surveys. As it was evidenced the response rate to severe wheeze in the video questionnaire was higher than the response rate in the written one (2.4% and 1.8%, respectively).

Our prevalence of 12-month rhinitis symptoms without a cold (57.4%) was minimally lower than the 1998-survey in Bangkok (61%).<sup>11</sup> Similarly these symptoms interfering with daily activities and hay fever ('allergic to air' in Thai) in this study were minimally lower than the respective symptoms reported in the Bangkok study (46.9% and 34.3% vs. 48.7% and 41.7%, respectively).<sup>11</sup> Nevertheless these numbers were extremely high compared to the study in 1995 in Bangkok students (21.9%).<sup>13</sup> In 1995

study, allergic rhinitis was referred to 'frequent attacks of nasal symptoms'. The results of both surveys in adults using the ISAAC questionnaire may indicate that allergic rhinitis increased in Thai adults in the recent years.

The combination of eye and nose symptoms was considered to have a high positive predictive value for the diagnosis of allergic rhinitis by the ISAAC Committee.<sup>20</sup> However Thai allergic rhinitis populations have more perennial symptoms as shown in this study (Fig.1) and in the Bangkok study.<sup>11</sup> This is likely caused by two of the most common allergens in Thailand, the house dust mite and cockroach,<sup>21,22</sup> which are found indoors all year round. While allergic eye symptoms are more seasonal, the rhinoconjunctivitis prevalence may not be representative for allergic rhinitis in the Thai population. The fact that rhinitis symptoms interfere with daily activities both in Phitsanulok and Bangkok University students at the same high rates indicates its importance in the impairment of quality of Thai adult life. Perhaps the cause of rhinitis in our study was not only attributable to allergies but also to exposures to irritant air pollutants since the levels of particulate air pollutants (PM10) in Phitsanulok was reportedly higher than the standard normal range.<sup>23</sup> A high level of particulate air pollutants was also reported in Bangkok during the 1998 survey.<sup>24</sup> Rhinoconjunctivitis in our study was shown as a high risk factor for asthma like in Bangkok<sup>11</sup> which was evidenced by a 3.2 fold increase of asthma patients in the rhinoconjunctivitis group. The strong relationship between allergic rhinitis and conjunctivitis is demonstrated by that nearly half (42%) of the patients with allergic rhinitis experienced allergic conjunctivitis.<sup>25</sup> Moreover there have been epidemiological, pathophysiological and clinical studies showing a strong relationship between rhinitis and asthma.<sup>26-28</sup> For example an estimated 30% of patients with perennial rhinitis have signs of asthma, and the majority of patients with asthma present with allergic rhinitis symptoms.<sup>27,28</sup> Our result could indicate that allergic rhinoconjunctivitis, like allergic rhinitis, is concomitant with allergic asthma.

For atopic dermatitis, as the validity of the ISAAC questionnaire in the Thai language has not been verified, we focused on the questions limiting the distribution of the rash to the flexural areas

which are closely related to atopic dermatitis. Our study showed a high prevalence of atopic dermatitis (15.0%), significantly above the results of the study in Bangkok University students (9.4%)<sup>11</sup> and of ISAAC studies in Thai children.<sup>8-10</sup> The explanation for the high prevalence is not known. One explanation could be that the Thai word "allergic rash" used for "eczema" in the questionnaire was likely misinterpreted as chronic urticaria or contact dermatitis. Another explanation could be that there truly was a higher allergic prevalence in the adult population in Phitsanulok than in Bangkok. However atopic dermatitis questions in ISAAC questionnaires using Thai language need further validation and more studies are required to confirm this high prevalence in the adult population in Phitsanulok.

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