Prevalence and severity of symptoms of asthma, rhinitis, and eczema in 13- to 14-year-old children in Taipei, Taiwan

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Background: The prevalence of asthma and allergic diseases in children has increased worldwide.

Objective: To perform the phase 3 survey of the International Study of Asthma and Allergies in Children (ISAAC) to report the time trend of the prevalence and severity of asthma and allergic diseases in children in Taipei.

Methods: Two junior high schools in each of the 12 school districts in Taipei were randomly chosen to enter the study. All students aged 13 to 14 years in the chosen schools were invited to participate in written and video questionnaires in Chinese (identical to those of the ISAAC phase 1 survey). The study was performed between December 1, 2001, and January 31, 2002. All data analysis followed the protocol of the ISAAC and then was submitted to the ISAAC International Data Center.

Results: Of 6,653 eligible children from 23 high schools (1 school refused participation), 6,381 (95.9%) participated. The prevalence of symptoms of asthma, allergic rhinitis, and atopic eczema in the past 12 months in 13- to 14-year-old children increased by 37%, 51%, and 193%, respectively, on written questionnaires during a 7-year period. The severity of asthma symptoms, including more than 4 wheezing attacks in the past 12 months, wheezing that disturbs sleep more than once per week, and wheezing that limited speech in the past 12 months, did not show any significant changes on written questionnaires during the 7 years.

Conclusion: The increasing prevalence of symptoms of asthma, allergic rhinitis, and atopic eczema in 13- to 14-year-old children in Taipei in a 7-year period is a significant burden on public health systems in Taiwan.

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INTRODUCTION

There is increasing evidence that the prevalence of asthma and other allergic conditions, such as allergic rhinitis and atopic eczema, has been increasing in children in some countries during the past 40 years, especially in Western countries.[1–3] The prevalence of asthma in children has also been increasing in Taipei in Taiwan.[4] According to hospital admission rates, asthma morbidity rates have also risen throughout the world, although some countries have reported a decline in admission rates in recent studies.[5–7] The increasing prevalence and severity of asthma and allergies represents significant economic and social burdens on patients, families, and societies throughout the world. This situation highlights the need for continuous monitoring and evaluation of the dynamics of these disorders and the factors that influence their trends. Even worldwide variation in the prevalence of allergic diseases cannot be completely explained by current knowledge of recognized risk or protective factors.[8,9]

The International Study of Asthma and Allergies in Childhood (ISAAC) has developed a simple and standard method for different areas and languages, using validated written and video questionnaires, to perform epidemiologic surveys of childhood asthma and other allergies around the world. Taipei, the capital of Taiwan, conducted the ISAAC phase 1 study in 1994 and 1995.[10] The ISAAC was designed to allow comparisons of the prevalence of asthma and other allergic disorders between populations in different countries, thereby forming the basis for studies investigating the roles of possible modifiable environmental factors.[9] To understand the time trends and the relationships of certain risk factors associated with asthma and allergic diseases, ISAAC phase 3 study fieldwork has been conducted since 2001. We joined the phase 3 survey following the ISAAC protocols. The survey aims (1) to report the current and cumulative prevalence and severity of asthma, allergic rhinitis, and atopic eczema symptoms in children in Taipei and (2) to evaluate the time trends of the prevalence and severity of the symptoms of asthma and allergic diseases from the results of ISAAC phase 1 and phase 3 studies.

MATERIALS AND METHODS

Population

Two junior high schools in each of the 12 school districts in Taipei were randomly chosen to enter the study. All the

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schools except 1 agreed to participate in the survey. To meet the ISAAC selected age group, all 13- and 14-year-old students in the chosen junior high schools were invited to participate in written and video questionnaires in Chinese (identical to those of the ISAAC phase 1 survey). The method of school samplings in the study was also identical to that used in the phase 1 study in 1994. The survey was performed between December 1, 2001, and January 31, 2002. The Taipei ISAAC phase 1 study was conducted during the same time of the year. The total number of eligible children from the 23 schools was 6,653. A total of 6,381 students completed the questionnaires, yielding a response rate of 95.9%. Written parental informed consent was obtained individually from children through the school administrations. Permission for visiting the schools was obtained from the Taipei Ministry of Education and the Taipei Ministry of Health. The Chang Gung Children's Hospital ethics committee also approved the study.

Questionnaires

The ISAAC was, in brief, a 3-phase, multicenter, multinational project, with phases 1 and 3 involving identical surveys performed at least 5 years apart to examine the spread and time trends of childhood allergies worldwide.[11] The ISAAC phase 1 core questionnaires were designed to evaluate the prevalence and severity of symptoms of asthma, allergic rhinitis, and atopic eczema.[12] In addition to the written questionnaires, video questionnaires (version 3.0 international), which showed 5 sequences related to asthma symptoms and severity, were also applied to minimize the potential bias of various responses for descriptive terms used.[12] Following the protocol of the ISAAC, the English questionnaires were translated into Chinese and then back into English to ensure that the translation was appropriate in the ISAAC phase 1 study in Taiwan. To check the consistency of the survey method, the phase 3 study used the same core written and video questionnaires as the phase 1 study.

Outcome Measures

The main outcome measures used in this study were (1) the 12-month prevalence and severity of symptoms of asthma (current wheezing), allergic rhinitis (current rhinitis), and atopic eczema (current eczema) in the ISAAC phase 3 survey and (2) the time trends of the prevalence and severity of symptoms of asthma, allergic rhinitis, and atopic eczema from ISAAC phase 1 to phase 3.

Data Analysis

The collected questionnaires were double entered into a database and checked. The data analysis process followed the protocol provided in the ISAAC Coding and Data Transfer Manual, and the quality was verified by the ISAAC International Data Center. If there were inconsistencies between the responses to the stem and branch questions, the entire item was coded as missing. All prevalences are expressed as percentages, and 95% confidence intervals of the rates were estimated when necessary. χ^2 Tests were used to test the statistical differences between 2 categories. Odds ratios for evaluating relationships of risk factors and outcome variables were estimated using logistic regressions. Analyses were performed using a statistical software program (SAS version 8.2; SAS Institute Inc, Cary, NC). $P < .05$ was considered statistically significant.

RESULTS

Self-reported Prevalence

Of the 6,381 respondents, 78 were excluded because they were not aged 13 to 14 years. As a result, the number of valid questionnaires for the following analysis was 6,303. Table 1 provides the self-reported prevalences of symptoms of asthma, allergic rhinitis, and atopic eczema. The prevalences of "asthma ever" and "wheezing ever" were 17.2% and 14.4%, respectively. Boys tended to have a higher reported prevalence than girls, although it was significant only for "asthma ever" ($P < .001$). For the current status (episodes occurring in the past 12 months), the prevalences of wheezing, exercise-induced wheezing, and nocturnal cough were approximately 7.1%, 19.7%, and 12.7%, respectively. Girls were reported to have more occurrences, especially of exercise-induced wheezing and nocturnal cough ($P = .02$ for both).

The self-reported prevalences of the symptoms "rhinitis ever," "hay fever ever," current rhinitis, and current rhinoconjunctivitis were 53.0%, 34.2%, 43.6%, and 18.1%, respectively. Boys had significantly higher prevalences of "rhinitis ever" and current rhinitis ($P < .001$ and $P = .04$, respectively). Girls, on the contrary, reported more current rhinoconjunctivitis ($P = .007$). Approximately 7.4% of the students had "itchy rash ever," 5.5% reported having current itchy rash, and 4.1% had at least 1 itchy flexural rash in the past year. As for eczema, the reported prevalence was estimated to be approximately 17.4%.

Severity

The prevalences of the severity of symptoms of current wheezing, rhinitis, and eczema are given in Table 2. The denominator of the prevalence is the number of patients who reported having that specific symptom. Approximately 14.8% of current wheezers (n = 441) experienced severe wheezing that limited speech in the past 12 months. Most of them (90.9%) had at least 1 wheezing attack, and 41.6% had wheezing episodes that disturbed their sleep in the same period. Of the students who reported current rhinitis (n = 2,725), 85.1% thought that it had affected daily activities, and 10.5% of the students with itchy rash in the past 12 months had at least 1 episode of waking during the night caused by a rash. Regarding the different symptoms of the 3 allergic diseases under analysis, boys and girls did not demonstrate any significant differences in severity except that girls had more sleep disturbances caused by current wheezing than boys ($P = .03$) (Table 2).

Table 1. Self-reported Prevalence of Symptoms of Asthma, Rhinitis, and Eczema From Written Questionnaires of the ISAAC Project in 13- to 14-Year-Old Children in Taipei in 2001–2002*

Symptoms	Boys (n = 3,203)	Girls (n = 3,093)	Total (N = 6,303)	*P* value
Asthma				
Asthma ever	19.4	15.0	17.2	<.001
Wheezing ever	14.8	13.8	14.4	.26
Wheezing in the past 12 mo	6.8	7.3	7.1	.51
Exercise-induced wheezing in the past 12 mo	18.5	20.9	19.7	.02
Nocturnal cough in the past 12 mo	11.7	13.7	12.7	.02
Allergic rhinitis				
Rhinitis ever	55.5	50.5	53.0	<.001
Rhinitis in the past 12 mo	44.9	42.3	43.6	.04
Rhinoconjunctivitis in the past 12 mo	16.8	19.4	18.1	.007
Hay fever ever	33.1	35.3	34.2	.07
Atopic eczema				
Recurrent itchy rash† ever	7.2	7.7	7.4	.45
Recurrent itchy rash in the past 12 mo	5.0	6.1	5.5	.048
Recurrent itchy flexural rash in the past 12 mo	3.5	4.8	4.1	.008
Clearance of itchy rash in the past 12 mo	2.2	2.4	2.3	.55
Eczema ever	17.3	17.5	17.4	.85

Abbreviation: ISAAC, International Study of Asthma and Allergies in Children.
* Data are given as percentages.
† Rash lasting at least 6 months.

Table 2. Prevalence of the Severity of Asthma, Rhinitis, and Eczema Symptoms in the Past 12 Months From Written Questionnaires of the ISAAC Project in 13- to 14-Year-Old Children Reporting Symptoms in the Previous 12 Months in Taipei in 2001–2002*

Symptoms	Boys	Girls	Total	*P* value
Wheezing in the past 12 mo, No.	217	223	441	
Severe wheezing that limited speech in the past 12 mo	15.1	14.2	14.8	.78
Wheezing attacks in the past 12 mo				.16
1–3	73.6	68.8	71.2	
4–12	10.7	18.1	14.4	
>12	6.0	4.5	5.3	
Episodes of sleep disturbance by wheezing in the past 12 mo				.03
<1 per week	32.4	35.8	34.0	
≥1 per week	4.7	10.6	7.6	
Rhinitis in the past 12 mo, No.	1,420	1,302	2,725	
Rhinitis affecting daily activities ever				.06
Little	51.0	49.3	50.2	
Some	26.2	23.9	25.1	
Severe	8.6	11.1	9.8	
Recurrent itchy rash in the past year, No.	157	188	345	
Night awakening by rash in the past 12 mo				.09
<1 night per week	27.6	30.9	29.4	
≥1 night per week	7.1	13.3	10.5	

Abbreviation: ISAAC, International Study of Asthma and Allergies in Children.
* Data are given as percentages unless otherwise indicated.

Prevalence Comparisons in ISAAC Phase 1 and Phase 3

We compared our study findings with phase 1 results reported in 1998 (Table 3).[10,13,14] Most of the observed prevalences increased during the 7 years, as reflected by written and video questionnaire responses on current or "ever" occurrences.

From the written questionnaires, the self-reported prevalence of wheezing in the past 12 months increased by 37%, from 5.2% to 7.1% ($P < .001$). The prevalences of exercise-induced wheezing and nocturnal cough in the past 12 months also increased, from 8.2% to 19.7% and from 10.4% to 12.7%, respectively ($P < .001$ for both). The prevalence of symptoms of rhinitis in the past 12 months increased 1.5 fold, from 28.8% to 43.6% ($P < .001$), during the 7 years of study. By using recurrent itchy rash in a typical atopic eczema

Table 3. Time Trend of the Prevalence and Severity of Asthma, Rhinitis, and Eczema Symptoms From ISAAC Phase 1 to Phase 3 in 13- to 14-Year-Old Children in Taipei*

Symptoms	Phase 1 (1994–1995)	Phase 3 (2001–2002)	*P* value
Written questionnaire, No.	11,400	6,303	
Asthma symptoms			
Wheezing in the past 12 mo	5.2 (4.8–5.6)	7.1 (6.4–7.7)	<.001
Asthma ever	9.0 (8.4–9.5)	17.2 (16.3–18.2)	<.001
Exercise-induced wheezing in the past 12 mo	8.2 (7.7–8.7)	19.7 (18.7–20.7)	<.001
Nocturnal cough in the past 12 mo	10.4 (9.8–10.9)	12.7 (11.8–13.5)	<.001
≥4 Wheezing attacks in the past 12 mo	1.6 (1.4–1.9)	1.4 (1.1–1.7)	.19
Wheezing that disturbed sleep ≥1 per week in the past 12 mo	0.4 (0.3–0.5)	0.5 (0.3–0.7)	.27
Severe wheezing that limited speech in the past 12 mo	0.8 (0.7–1.0)	1.0 (0.8–1.3)	.20
Rhinitis symptoms			
Rhinitis ever	35.1 (34.3–36.0)	53.0 (51.8–54.3)	<.001
Rhinitis in the past 12 mo	28.8 (28.0–29.6)	43.6 (42.4–44.8)	<.001
Hay fever ever	33.2 (32.3–34.1)	34.2 (33.0–35.4)	.19
Rhinoconjunctivitis in the past 12 mo	11.3 (10.7–11.9)	18.1 (17.1–19.0)	<.001
Limited activities in the past 12 mo	21.5 (20.7–22.3)	36.7 (35.5–37.9)	<.001
Atopic eczema symptoms			
Recurrent itchy rash in a typical eczema distribution in the past 12 mo	1.4 (1.1–1.6)	4.1 (3.6–4.6)	<.001
Eczema ever	11.8 (11.2–12.4)	17.4 (16.4–18.3)	<.001
Severe eczema† in the past 12 mo	0.2 (0.1–0.3)	0.5 (0.3–0.7)	.001
Video questionnaire, No.	4,211	6,303	
Wheezing at rest in the past 12 mo	4.6 (4.0–5.3)	6.7 (6.1–7.4)	<.001
Exercise wheezing in the past 12 mo	6.0 (5.3–6.7)	9.0 (8.3–9.7)	<.001
Night wheezing in the past 12 mo	1.8 (1.4–2.2)	2.0 (1.6–2.3)	.44
Night cough in the past 12 mo	3.4 (2.8–3.9)	5.4 (4.8–6.0)	<.001
Severe wheezing that limited speech in the past 12 mo	2.8 (2.3–3.3)	2.8 (2.4–3.2)	.95

Abbreviation: ISAAC, International Study of Asthma and Allergies in Children.
* Data are given as percentages (95% confidence intervals) unless otherwise indicated.
† Night awakening by itchy rash 1 or more nights per week in the past 12 months.

distribution as the indicator of atopic eczema, the prevalence of eczema symptoms in the past 12 months also increased 3-fold, from 1.4% to 4.1% ($P < .001$).

The severity of symptoms of allergic rhinitis (limited daily activities) and atopic eczema (awakening by itchy rash at least once a week) also increased. However, the prevalences of severe symptoms of current wheezing, including 4 or more wheezing attacks in the past 12 months, wheezing that disturbed sleep once or more per week, and wheezing that limited speech in the past 12 months, did not show any significant differences between ISAAC phase 1 and phase 3.

Seasonal Variation

Taipei had 2.6 million citizens in 2002. It is situated in a basin in the north of Taiwan and has a subtropical climate. Although it generally has warm weather, it can be rather cold owing to the high relative humidity (65%–90% throughout the year) and the influence of northeastern monsoons in winter. Therefore, we plotted the monthly prevalence of symptoms of wheezing and rhinitis during the previous 12 months to study seasonal patterns (Fig 1). The results showed that these 2 symptoms started to increase in October, reaching the highest point in December, and gradually decreasing thereafter.

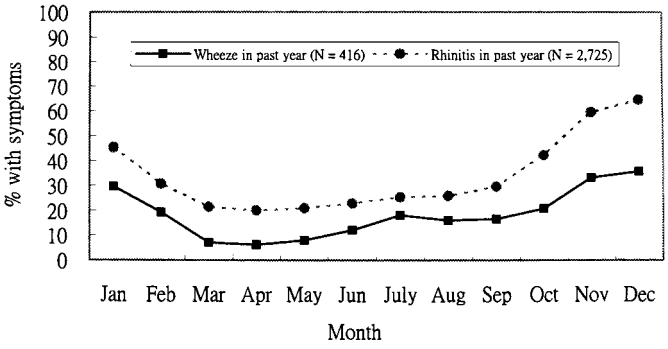

Figure 1. The seasonal change in the prevalence of symptoms of rhinitis and wheezing in the past 12 months in 13- to 14-year-old children who were symptomatic in Taipei in 2001–2002.

Relationship of Current Wheezing to Selected Factors

Current wheezers are the focus of daily asthma care. We examined the relationship between selected factors and current wheezing using multiple logistic regression models (Table 4). Of all the factors, the diagnosis or existing symptoms of respiratory allergies (rhinitis or asthma) had a significant

Table 4. Relationship of Current Wheezing to Selected Factors on Questionnaires Using Multiple Logistic Regression in 5,855 Children Aged 13 to 14 Years in Taipei in 2002 (Phase 3 Study)

	OR (95% CI)	*P* value
Male sex	0.92 (0.72–1.18)	.51
Rhinitis symptoms in the past 12 mo	2.52 (1.91–3.32)	<.001
Hay fever ever	1.33 (1.03–1.71)	.03
Recurrent itchy flexural rash in the past 12 mo	1.52 (0.97–2.39)	.07
Eczema ever	1.08 (0.80–1.45)	.61
Exercise-induced wheezing in the past 12 mo	7.32 (5.69–9.42)	<.001
Nocturnal cough in the past 12 mo	1.85 (1.41–2.42)	<.001
Asthma ever	8.21 (6.38–10.55)	<.001

Abbreviations: CI, confidence interval; OR, odds ratio.

relationship with current wheezing. However, skin symptoms or eczema did not reveal a significant relationship with current wheezing.

DISCUSSION

In this study, we used the same core written and video questionnaires used in ISAAC phase 1 to evaluate the prevalence and severity of asthma and other allergic disorders 7 years later. The consistency of the survey methods was believed to make the results more comparable. In this study, we collected 6,303 valid questionnaires, less than the 11,400 collected in the phase 1 study performed in 1994–1995.[13] However, this shortage in sample size did not affect the statistical power of the comparisons.

The results of the present study show that the current prevalence of asthma symptoms significantly increased during the 7 years between 1994–1995 and 2001–2002 when using the identical ISAAC written questionnaire. For wheezing in the past 12 months, the self-reported prevalence increased by 37%, from 5.2% to 7.1%. Even this figure was still on the low side compared with previous studies from around the world.[13] The prevalence of exercise-induced wheezing and nocturnal cough in the past 12 months increased from 8.2% to 19.7% and from 10.4% to 12.7%, respectively.

Not only was the self-reported prevalence of current wheezing increased but also the prevalence of "asthma ever" in Taipei increased to 17.2% from 9.0%. Compared with other previous studies concerning the prevalence of asthma symptoms in children in Taipei, the prevalence of "asthma ever" and "wheezing ever" seemed more prevalent than before. Hsieh and Shen[4] reported that the prevalence of asthma symptoms among 7- to 15-year-olds in Taipei was 1.3% in 1974 and 5.1% in 1985. Our results demonstrate the increased current prevalence of asthma symptoms in the population, the seasons, and the city using identical standardized questionnaires during a 7-year interval.

The prevalence of severe symptoms of wheezing in the past 12 months, including wheezing attacks at least 4 times a year, wheezing that disturbed sleep at least once a week, and wheezing that limited speech, in 2001–2002 did not show a significant difference from the report in 1994–1995 in our study. This means that there was no change in the severity of asthma symptoms during the 7-year period. The video questionnaire also revealed that severe wheezing with limited speech did not have a significant difference between ISAAC phase 1 and phase 3 studies (2.8% in 1994–1995 and 2.8% in 2001–2002) despite an increased current prevalence of asthma symptoms. Early diagnosis and management of asthmatic children due to early awareness of asthma symptoms by physicians and parents, preventing exacerbation or underreporting of severe symptoms by adolescents, are some possible reasons for the lack of change. The severe wheezing symptoms also might be controlled to balance the increase in severe symptoms due to recent improvements in public education and medications for asthma in Taipei City. However, like recent reports of the variable trends in hospital admission rates for asthma in different countries around the world, there are still some studies revealing the opposite results and showing the severity of asthma and respiratory symptoms still increasing in some populations and areas.[7,15,16] It is also possible that some environmental factors can affect the prevalence of severe wheezing symptoms in different areas. The exact mechanisms responsible for the differences need to be explored in future studies.

The symptoms of allergic rhinitis were probably the most prevalent of all the symptoms of allergic diseases in Taipei. The prevalences of "rhinitis ever" and rhinitis in the past 12 months in 2001–2002 were estimated to be 53.0% and 43.6%, respectively. Our results also showed that the prevalence and severity of rhinitis symptoms in 13- to 14-year-old children in Taipei significantly increased during 7 years of study. The prevalence of symptoms of rhinitis in the past 12 months increased 1.5-fold (from 28.8% to 43.6%) during the 7 years. Even using the stricter symptoms of rhinitis with concurrent itchy conjunctivitis as the indicator of allergic rhinitis symptoms, the prevalence still showed a significant 1.6-fold increase (from 11.3% to 18.1%). The activity level of children was significantly more affected by the symptoms of rhinitis (from 21.5% to 36.7%) than in the ISAAC phase 1 study.

Like rhinitis symptoms, the prevalence and severity of atopic eczema symptoms in 13- to 14-year-old children in Taipei also significantly increased during the 7-year period.

By using recurrent itchy rash in a typical atopic eczema distribution as the indicator of atopic eczema, the prevalence of eczema symptoms in the past 12 months also increased 3-fold (from 1.4% to 4.1%). The prevalence of severe eczema, defined as awakening at least once a week due to itchy eczema, also showed an increase (from 0.2% to 0.5%). Maziak et al[16] also reported that there was a tendency toward an increase in current symptoms for all 3 allergic conditions in both age groups from ISAAC phase 1 to phase 3. Like the increase in asthma prevalence, the reasons for the increased prevalence and severity of rhinitis and atopic eczema symptoms are multifactorial and need to be further explored.

This study showed that there was significantly more self-reported prevalence in 13- to 14-year-old girls concerning the symptoms of allergic diseases during the previous 12 months, including exercise-induced wheezing, nocturnal cough, rhinitis and rhinoconjunctivitis, and recurrent itchy eczema with or without a typical distribution, in 2001–2002. The prevalence of wheezing in the past 12 months was also higher in girls, although it was nonsignificant (7.3% for girls vs 6.8% for boys).

There was no significant sex difference in 13- to 14-year-old adolescents for most of the severity distribution of wheezing, rhinitis, and atopic eczema symptoms in the past 12 months, including the number of wheezing attacks, limiting speech by severe wheezing, daily activity affected by rhinitis, and night awakening by itchy rash. Girls even had a significantly higher prevalence of nocturnal wheezing that disturbed sleep in the past 12 months in our study. Many studies have had similar observations, which have shown both sexes with similar severity or girls affected more often. Montefort et al[17] claimed that Maltese adolescent girls had more severe symptoms of wheezing attacks and nocturnal wheezing that disturbs sleep in 1998, although the result was statistically nonsignificant. In 1997, Leung et al[18] reported the results of ISAAC phase 1 in Hong Kong and found that the sex difference became less obvious and even disappeared when only severe wheezing that limited speech and wheezing with sleep disturbance were considered. Fagan et al[19] also reported on the severity of wheezing and rhinitis in the adolescent population. Girls had significantly more wheezing attacks, wheezing that disturbed sleep, severe wheezing that limited speech, and rhinitis that interfered with daily activities in the United States in 2001. Furthermore, girls were significantly more likely than boys to have visited an emergency department for asthma in the past year. The relationship between sex and the severity of wheezing remained significant even after controlling for age, race, family history of asthma, and exposure to passive smoke and dampness in a regression model.[19]

Seasonal variations in the symptoms of rhinitis and wheezing in the past 12 months emphasized the effect of weather change on symptoms. The 2 symptoms reached the highest point in December and remained more prevalent in the winter months of January and February in Taiwan. The cold and wet weather seemed to be related to increased episodes of upper and lower airway allergic diseases. Montefort et al[17] also reported that nasal symptoms had a seasonal variation, with most cases being at their worst in February to April in Maltese 13- to 15-year-old children from an ISAAC phase 1 study. The possible explanations were allergic causes of these allergic symptoms or a combination of an increase in aeroallergen counts, weather conditions, and viral infections in the winter season.[17]

According to the analysis results, current wheezing was significantly associated with current rhinitis, current exercise-induced wheezing, current nocturnal cough, and "asthma ever." Current wheezers had concurrent rhinitis symptoms as high as 76.6% in our population. Therefore, proper management of nasal and bronchial allergy at the same time is important for asthmatic children. Besides, 72% of current wheezers in our study had experienced exercise-induced wheezing, which might have made them avoid exercise, even to the extent of damaging their social relationship at schools. Teaching asthmatic children how to prevent and manage exercise-induced wheezing is another important issue in the care of asthmatic adolescents in Taiwan.

In conclusion, the prevalence of symptoms of asthma, allergic rhinitis, and atopic eczema in 13- to 14-year-old adolescents in Taipei increased during a 7-year period. However, most of the prevalence of severe symptoms of asthma is not different from the results from 7 years earlier. The increasing prevalence is still a significant burden on public health systems, families, and children's well-being in Taiwan.

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