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ORIGINAL ARTICLE

A survey of allergic rhinitis in Taiwanese asthma patients

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Background: Allergic rhinitis (AR) often coexists with and can significantly worsen bronchial asthma (BA). We evaluated the proportion of patients with BA and concomitant AR (BA + AR) diagnosed and treated in an average clinical practice.

Methods: A cross-sectional study methodology was used to determine the prevalence of AR in patients more than 15 years of age with a documented history of asthma who experienced wheezing during the prior 12 months. The International Study of Asthma and Allergies in Childhood standardized written questionnaire was used and therapeutic class choices were recorded.

Results: Among 750 surveyed asthma patients, 524 patients (69.9%) experienced AR. Of those with BA and AR, there were 44 patients (8.4%) who were not diagnosed with AR, and the treatment rate for AR was 62.1%. The most frequent severity level of BA and AR were moderate persistent (38.9%) and intermittent mild (52.5%), respectively. There were no significant differences between patients with AR and without AR.

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Conclusions: The prevalence of AR in patients with asthma was 69.9% in this study. Despite Allergic Rhinitis and its Impact on Asthma guideline recommendations encouraging evaluation and treatment of AR among asthmatics, nearly 8.4% of asthmatics with AR were undiagnosed, and 37.9% of asthmatics with AR were untreated for AR.

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Introduction

Allergic rhinitis (AR) is often a comorbid condition seen with bronchial asthma (BA), and it has been proposed to be a marker for the presence of more difficult to control asthma.^{1–3} Some experts believe that they are likely the manifestations of the same syndrome of allergic origin because of their pathophysiological similarities. Evidence for this link has not only mainly been found through clinical observations and epidemiological studies but also from immunological observations and therapy outcomes.^{4,5} This concept has been labeled “one airway, one disease”⁶ or “united airways disease.”⁷ In addition, the management of asthma and AR have been closely correlated because of the impact on both health care costs and asthma outcome.⁸ Thus, Allergic Rhinitis and its Impact on Asthma (ARIA) guidelines recommend that patients with asthma should be evaluated for the presence of AR and a combined treatment strategy for asthma and AR be administered.⁹ However, there are only a few epidemiologic reports in the English literature regarding the prevalence of BA in AR in Asian countries compared with abundant data in Western countries.

Evaluation and control of AR in patients with asthma, initiated in 2006, is a nationwide surveillance study designed to determine the prevalence of AR in patients with asthma in Taiwan. To achieve a better understanding of the association of BA and AR in an Asian country, we conducted this study to evaluate the prevalence of AR in Taiwanese patients with asthma who receive regular asthma treatment and to investigate whether those patients diagnosed with AR have been treated for AR.

Patients and methods

A nationwide sample of nine hospitals was selected for conducting the study, including three medical centers and six regional hospitals, distributed from north to south Taiwan. Patients more than 15 years of age with a documented history of asthma who experienced wheezing during the past 12 months were enrolled in this study. This study was approved by the Institute Review Board in each hospital. And all signed consent forms of patients were obtained when patients participated. Patients with chronic obstructive pulmonary disease, congenital heart diseases, and severe respiratory diseases other than asthma were excluded.

Subjects were outpatients who visited hospitals for their asthma treatment, all procedures were conducted in a single visit, and patient medical records were reviewed. Subjects were interviewed face-to-face at clinic and the International Study of Asthma and Allergies in Childhood

(ISAAC)¹⁰ standardized written questionnaire was used to identify symptoms of asthma and AR. Severity of asthma and AR were evaluated based on Global Initiative for Asthma guidelines¹¹ and ARIA guidelines, respectively.⁹ Therapeutic class choice was recorded.

Statistical analyses

The proportion of patients with BA and those with concomitant AR were determined. Results are presented as mean \pm standard deviation. The means of two groups were analyzed by Student *t* test and the data of subgroup were analyzed by Chi-square test. The statistical significance was determined by a *p* value lesser than 0.05. All statistical analyses were performed using the SAS software, version 9.1 (SAS Institute, Cary, NC, USA).

Results

From November 1, 2006 to October 31, 2007, a total 750 asthma patients were recruited. The age distribution, gender, years with asthma diagnosis, and severity of BA and AR were recorded (Table 1). The average patient age was 50.6 ± 17.4 years old; 42.3% were male. There were no significant differences between patients with AR and without AR, except for age. The patient group with AR seemed to be younger than those without AR (48.7 ± 17.1 years vs. 55.1 ± 17.5 years; $p < 0.05$).

Among the 750 asthma patients, 524 patients (69.9%) experienced sneezing or a runny or blocked nose without a cold or the flu during the 12 months before evaluation. For most patients (480/524, 91.6%), the diagnosis of AR had been made concomitant with BA. However, there were 44 patients (8.4%) who were not diagnosed with AR, although they had reported AR symptoms. The distribution of severity of asthma and drugs used to treat BA and AR are presented in Tables 2–4, respectively. The mean years of asthma diagnosis was 11.6 ± 14.6 . The most frequent level of BA severity was moderate persistent (38.9% overall, 39.5% in patients with AR, and 37.2% in patients without AR), followed by mild persistent (26.8% overall, 26.7% in patients with AR, and 27.0% in patients without AR), intermittent (19.1% overall, 19.5% in patients with AR, and 18.1% in patients without AR), and severe persistent (15.3% overall, 14.3% in patients with AR, and 17.7% in patients without AR). There was no significant difference between patients with AR and without AR. The frequencies of AR severity were intermittent mild (52.5%), intermittent moderate-severe (24.3%), persistent mild (11.9%), and persistent moderate-severe (11.3%). The mean years of AR diagnosis was 14.8 ± 16.3 ; 303 patients (63.1%) had seasonal-type AR, and 177 patients (36.9%) had perennial

Table 1 Patient characteristics

Patients with asthma diagnosis	With AR (<i>n</i> = 524)	Without AR (<i>n</i> = 226)	Total (<i>n</i> = 750)
Age ^a	48.7 ± 17.1	55.1 ± 17.5	50.6 ± 17.4
Gender			
Female, <i>n</i> (%)	306 (58.4)	127 (56.2)	433 (57.7)
Male, <i>n</i> (%)	218 (41.6)	99 (43.8)	317 (42.3)
Smoking status			
Never smoked, <i>n</i> (%)	387 (73.8)	156 (69.0)	543 (72.4)
Past smoker, <i>n</i> (%)	81 (15.5)	36 (15.9)	117 (15.6)
Current smoker, <i>n</i> (%)	56 (10.7)	34 (15.1)	90 (12.0)

^a *p* < 0.05 by the *t* test to assess mean between two groups.
AR = allergic rhinitis.

AR with seasonal exacerbation. The most popular drug for treating BA was a fixed dose combination of inhaled corticosteroid and long-acting β_2 agonist, and most patients were treated with four and more therapies combined. Most patients had their AR with an oral H1 blocker (61.0%) followed by a leukotriene antagonist (31.3%). The treatment rate for AR in patients with BA and AR patients was 62.1%.

Discussion

Epidemiologic studies have suggested that asthma and AR often coexist in the same patient. A recent survey demonstrated that 20–40% of patients with AR have asthma, and 30–90% patients with asthma have AR.³ The

observed prevalence of AR in patients with asthma varies considerably throughout the world. A literature review indicated 50–100% prevalence of AR in patients with allergic asthma in the United States and in Europe.² However, the prevalence of AR in patients with asthma was estimated at only 6.2% in a single study from China.¹² There are at least two factors that may explain the discrepancy in reported prevalence between studies. First, different source criteria were applied across studies, including sampling population, age profiles, and methods used to collect the data. Second, the diagnostic criteria used to define asthma and AR were not standardized across the published articles. Therefore, a standardized questionnaire, the ISAAC, was developed and has been used worldwide for the past decade to generate a reliable global

Table 2 Asthma evaluation

Patients with asthma diagnosis	With AR (<i>n</i> = 524)	Without AR (<i>n</i> = 226)	Total (<i>n</i> = 750)
Years with asthma diagnosis	11.5 ± 14.3 (<i>n</i> = 523)	11.8 ± 15.5 (<i>n</i> = 225)	11.6 ± 14.6 (<i>n</i> = 748)
Asthma severity			
Intermittent	102 (19.5)	41 (18.1)	143 (19.1)
Mild persistent	140 (26.7)	61 (27.0)	201 (26.8)
Moderate persistent	207 (39.5)	84 (37.2)	291 (38.9)
Severe persistent	75 (14.3)	40 (17.7)	115 (15.3)
Asthma treatment	519 (99.1)	226 (100)	745 (99.3)
Single therapy ^a	68 (13.1)	19 (8.4)	87 (11.7)
Two combined therapies	160 (30.8)	46 (20.4)	206 (27.6)
Three combined therapies	127 (24.5)	66 (29.2)	193 (25.9)
Four and more combined therapies	164 (31.6)	95 (42.0)	259 (34.8)
Therapy combinations			
Fixed dose combination of ICS + LABA ^b	362 (69.7)	177 (78.3)	539 (72.3)
Sustained-release theophylline ^b	235 (45.3)	133 (58.8)	368 (49.4)
Leukotriene modifier	150 (28.9)	51 (22.6)	201 (27.0)
Oral glucocorticosteroid ^b	137 (26.4)	81 (35.8)	218 (29.3)
Inhaled glucocorticosteroid ^b	98 (18.9)	27 (11.9)	125 (16.8)
LABA	59 (11.4)	18 (8.0)	77 (10.3)
LABA	42 (8.1)	19 (8.4)	61 (8.2)
Other ^b	40 (7.7)	43 (19.0)	83 (11.1)

^a *p* < 0.05 by Chi-square test for the distribution of treatment (single, two combined, three combined, four and more combined therapies) in two group (with AR vs. without AR)

^b *p* < 0.05 by the *t* test to assess mean between two groups (with AR vs. without AR).

Data are presented as mean ± standard or *n*(%).

AR = allergic rhinitis; ICS = inhaled corticosteroid; LABA = long-acting β_2 agonist.

Table 3 Allergic rhinitis evaluation

Asthma patients	(<i>n</i> = 750)
Asthma patient with allergic rhinitis symptom	524 (69.9)
The severity of allergic rhinitis	<i>n</i> = 522
Intermittent mild	274 (52.5)
Persistent mild	62 (11.9)
Intermittent moderate-severe	127 (24.3)
Persistent moderate-severe	59 (11.3)
Diagnosed with allergic rhinitis	480 (91.6)
Years of allergic rhinitis (<i>n</i> = 479)	14.8 ± 16.3
Type	
Seasonal	303 (63.1)
Perennial with seasonal exacerbation	177 (36.9)

Data are presented as *n*(%) or mean ± standard deviation.

map of prevalence.¹³ Utilizing the ISAAC questionnaire in the present study, the percentage of patients with AR among all patients with BA was 69.9%. This result was similar to the prevalence of 73% reported in an international survey of comorbid asthma and AR published by Valovirta and Pawankar.³ However, our results were higher than from recent studies in Europe (60%) and from Japan (52.4%).^{14,15}

In previous publications, age has always been a significant factor influencing the prevalence and impact of concomitant AR in people with asthma.¹⁵ The frequency of AR in asthma decreases with increasing age. Although we have focused our analysis on adult patients, the present findings are consistent with those of previous reports in that asthma patients with AR were younger than those without AR. More than two-thirds of the patients included in this survey were already experiencing AR symptoms when the

diagnosis of asthma was made. In many patients in our study, nasal symptoms occur before increased bronchial sensitivity and bronchial symptoms of asthma. This is consistent with reports in the literature and reflects the comorbid nature of these disorders.⁷

Among 524 patients with concomitant asthma and AR, 44 patients (8.4%) were not diagnosed with AR, although the patients reported AR symptoms. Moreover, nearly 40% of patients did not treat their AR at all. This suggests that the asthma management guidelines are not being adequately put in practice by physicians and patients. This result agrees with those of recent studies, which report unawareness and undertreatment of AR comorbid with BA.¹⁶ Indeed, the Global Initiative for Asthma guidelines disclosed that "special considerations" are required in managing asthma coexistent with AR, and treatment of AR may improve asthma symptoms.^{17,18} But, the guidelines offer no further recommendations, such as examination of the nose or asking the patient whether or how AR worsens their asthma. The ARIA guidelines were the first to stress the connection between AR and asthma.¹⁷ It is recommended to evaluate patients with persistent AR for asthma and to evaluate patients with asthma for rhinitis. A "combined strategy" to treat the upper and lower airways is advised.⁹ Hence, to achieve better control of asthma, awareness of this "combined strategy" needs to be heightened among physicians and incorporated by the primary care into daily clinical practice.

There are two limitations that need to be addressed regarding the present study. The first limitation concerns the cross-sectional nature of this research project, which has focused on prevalence of AR in asthma patients instead of the burden of asthmatic patients. The second limitation has to do with subjects who were enrolled from chest department and all investigators are chest specialist in those hospitals. Therefore, the findings of treatment distribution and clinical characteristics in present study cannot be overemphasized beyond the epidemiologic study.

Table 4 Distribution of allergic rhinitis treatment in asthma patients

Patients with asthma diagnosis	With AR (<i>n</i> = 524)	Without AR (<i>n</i> = 226)	Total (<i>n</i> = 750)
Treatments	326 (62.1)	24 (10.7)	350 (46.7)
Single therapy	221 (67.8)	23 (95.8)	244 (69.7)
Two combined therapies	78 (23.9)	1 (4.2)	79 (22.6)
Three combined therapies	25 (7.7)	0 (0.0)	25 (7.1)
Four and more combined therapies	2 (0.6)	0 (0.0)	2 (0.6)
Therapy combinations			
Oral H1 blocker	199 (61.0)	20 (83.3)	219 (62.6)
Leukotriene modifier	102 (31.3)	2 (8.3)	104 (29.7)
Oral decongestant	64 (19.6)	0 (0.0)	64 (18.3)
Nasal glucocorticosteroid	50 (15.3)	0 (0.0)	50 (14.3)
Nasal decongestant	12 (3.7)	1 (4.2)	13 (3.7)
Oral glucocorticosteroid	15 (4.6)	0 (0.0)	15 (4.3)
Nasal H1 blocker	1 (0.3)	0 (0.0)	1 (0.3)
Nasal ipratropium	0 (0.0)	1 (4.2)	0 (0.0)
Other	17 (5.2)	1 (4.2)	18 (5.1)

Data are presented as *n*(%).

AR = allergic rhinitis.

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