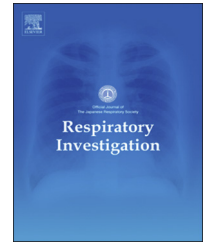


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## Original article

# Co-existence and seasonal variation in rhinitis and asthma symptoms in patients with asthma



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## ABSTRACT

**Background:** Asthma and rhinitis are common diseases that often occur concomitantly. However, in patients with asthma, the concurrent assessment of seasonal variation in rhinitis and asthma symptoms has not been comprehensively addressed. We prospectively evaluated seasonal changes in rhinitis and asthma symptoms over one year.

**Methods:** Fifty-six patients with asthma were enrolled. Asthma and rhinitis symptoms were assessed by using the State of the Impact of Allergic Rhinitis on Asthma Control (SACRA) questionnaire, developed and validated in Japan by the committee of Global Initiative for Asthma and the committee of Allergic Rhinitis for asthma and its impact on Asthma.

**Results:** Fifty-three patients completed the study. Forty-five patients (85%) had nasal symptoms during at least one or more seasons and 15 patients (28%) had perennial rhinitis. The association between asthma symptoms and rhinitis symptoms, assessed by a visual analogue scale (VAS), was significant during each season; seasonal variations of symptoms were synchronous. Uncontrolled asthma was more prevalent in patients with moderate-to-severe rhinitis compared to those with mild rhinitis. The VAS score of asthma symptoms in patients with asthma and perennial rhinitis was significantly higher than that in patients with non-perennial rhinitis or without rhinitis, across every season, except for spring. Correlations were more significant in patients less than 65 years of age than in older patients.

**Conclusion:** Rhinitis is common in patients with asthma. Symptoms of rhinitis and asthma often co-exist, and the association between these symptoms may be stronger in younger patients with asthma than older.

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Abbreviations: GINA, Global Initiative for Asthma; ARIA, Allergic Rhinitis for asthma and its Impact on Asthma; SACRA, State of the Impact of Allergic Rhinitis on Asthma Control; VAS, visual analogue scale; PR, perennial rhinitis; NPR, non-perennial rhinitis; ICS, inhaled corticosteroids; HDM, house dust mites

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## 1. Introduction

Allergic rhinitis and asthma are inflammatory diseases of the airways that share a common genetic characteristic. Approximately 20–60% of patients with allergic rhinitis have clinical asthma, whereas over >80% of patients with asthma have concomitant symptoms of rhinitis [1–3]. Pathophysiological studies have demonstrated that allergen challenge in the nasal or bronchial airways leads to marked inflammatory responses in the lower or upper airways [4,5]. Allergic rhinitis may negatively affect the clinical course of asthma. For example, in patients with asthma and allergic rhinitis, asthma-related emergency room admissions and hospitalization may be more frequent, and treatment costs may be higher, than in patients with asthma alone [6,7].

Two Japanese committees, the Global Initiative for Asthma and the Allergic Rhinitis for Asthma and its Impact on Asthma, developed the Self Assessment of Allergic Rhinitis and Asthma (SACRA) questionnaire, to evaluate asthma control and the presence and severity of allergic rhinitis and asthma symptoms in patients with asthma. Patients' perception of the disease was assessed using a visual analog scale (VAS). A cross-sectional nationwide study involving 29,518 patients with asthma in Japan used the SACRA questionnaire and found that 67.3% of patients with asthma also had rhinitis [8]. The study also demonstrated that most patients with asthma had moderate/severe rhinitis, and that patients with rhinitis had poorer asthma control than those without rhinitis [8].

Most epidemiological studies evaluating the link between rhinitis and asthma are cross-sectional [8–13], and few studies have concurrently examined seasonal changes in both asthma and rhinitis symptoms. We aimed to use the SACRA questionnaire to investigate the relationship between asthma and rhinitis symptoms in response to seasonal changes.

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## 2. Patients and methods

This was a prospective, observational study. Fifty-six consecutive adult patients with asthma (age 32–86 years) were recruited from the Respiratory Disease Center at Kitano Hospital, Japan between March 2012 and May 2012. The diagnosis of asthma was made based on the clinical history, presence of episodic dyspnea and wheezing, and response to inhaled bronchodilators. Serum levels of total and specific immunoglobulin (IgE) antibodies against common aeroallergens were measured using radioimmunosorbent tests and the CAP method (Pharmacia Diagnostics, Uppsala, Sweden). Tests for specific IgE antibodies were considered positive if the response level exceeded 0.35 IU/ml [14]. Specific IgE antibody responses were measured for 6 allergens: house dust mites (HDM), Japanese cedar pollen, mixed Gramineae pollens (orchard grass, sweet vernal grass, Bermuda grass, timothy, reeds), mixed weed pollens (ragweed, mugwort, goldenrod, dandelion, oxeye daisy), mixed molds (*Penicillium*, *Cladosporium*, *Aspergillus*, *Candida*, *Alternaria*), and animal dander (cat, dog). Patients with asthma were treated

according to the Asthma Prevention and Management Guidelines (Japan) [15]. Subjects were enrolled after oral informed consent was obtained. The study was approved by the Institutional Review Board of Kitano Hospital, according to the ethical guidelines of the 1975 Declaration of Helsinki (ethics approval date, reference number: April 27, 2011, E10-04-004).

### 2.1. Self-assessment of allergic rhinitis and asthma (SACRA) questionnaire

A detailed description of the SACRA questionnaire is provided elsewhere [8,9,16]. Briefly, the questionnaire included 4 questions on asthma control and a VAS assessment of the severity of symptoms, with scores ranging from “not at all bothersome” (0 cm) to “extremely bothersome” (10 cm). Patients were arbitrarily classified as having “poorly-controlled asthma” when answering “yes” to at least 1 in 4 questions on the following: the presence of daytime symptoms (more than 3 times), any limitation in activities of daily living, the presence of nocturnal symptoms, and the need for rescue medication (more than 3 times) in the preceding week.

The rhinitis questionnaire consisted of 4 questions on rhinitis symptoms, 2 on duration of symptoms, 4 on severity of the disease, and the same VAS assessment was used in the asthma questionnaire. The SACRA questionnaire was completed by patients in the waiting room, prior to their appointment with a respiratory physician. Based on the SACRA questionnaire, patients with asthma were classified as having one of the following: perennial rhinitis (PR), if they experienced rhinitis symptoms in all 4 seasons; non-perennial rhinitis (NPR), if they experienced rhinitis symptoms in 1, 2, or 3 seasons; and no rhinitis (None) if they did not experience any rhinitis symptoms throughout the year.

### 2.2. Statistical analysis

Values are expressed as mean±SD or median (range). Data were analyzed using Stat View 5.0 (SAS Institute, Cary, NC, USA). The Mann–Whitney U-test was used to analyze differences between groups. Comparisons among multiple groups were made using analysis of variance and Fisher's protected least significant difference test or the chi-square test. Correlations between data were analyzed by Spearman's rank correlation test. A *p* value less than 0.05 was considered significant.

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## 3. Results

### 3.1. Prevalence of rhinitis in patients with asthma

Of 56 patients with asthma, 53 responded with usable information (95% response rate). Of these, 35 (66%) experienced rhinitis symptoms in spring, 24 (45%) in summer, 32 (60%) in the fall, and 36 (68%) in winter. A total of 45 (85%) experienced rhinitis symptoms in 1 or more seasons (Fig. 1).

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