

Clinical usefulness of a guideline-based screening tool for the diagnosis of allergic rhinitis in asthmatics: the SACRA (Self Assessment of Allergic Rhinitis and Asthma) Questionnaire.

Masayuki Hojo¹, Ken Ohta², Motoyasu Iikura¹, Tomonori Mizutani¹, Junko Hirashima¹, and Haruhito Sugiyama¹.

1; Division of Respiratory Medicine, National Center for Global Health and Medicine.

2; Division of Respiratory Medicine, National Hospital Organization Tokyo Hospital,
Tokyo, Japan

Correspondence:

Masayuki Hojo M.D.

Division of Respiratory Medicine, National Center for Global Health and Medicine.

Toyama 1-21-1, Shinjuku, Tokyo, Japan 162-8655

FAX ; 81-3-3207-1038

E-mail address: mhojo@hosp.ncgm.go.jp

This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi: 10.1111/resp.12116

This article is protected by copyright. All rights reserved.

Summary at a glance

Allergic rhinitis is a common comorbidity in asthmatics impairing asthma control. It is still not routinely diagnosed nor treated. GINA and ARIA Japan Committees developed the guideline-based questionnaire SACRA in 2011. We demonstrated the clinical usefulness and validity of SACRA as a simple tool to diagnose and evaluate asthma/rhinitis severity.

ABSTRACT

Background and objective: Allergic rhinitis (AR) is common in asthmatic patients and may impair asthma control. However, this comorbidity is frequently missed. A simple test is needed to enable physicians to diagnose and evaluate the severity of both diseases. The SACRA (Self Assessment of Allergic Rhinitis and Asthma) Questionnaire, which GINA and ARIA Japan Committees developed in 2011, consist of questionnaires based on GINA and ARIA guidelines for the diagnosis and severity of AR and asthma, and a visual analog scale (VAS) to evaluate the severity of both diseases. Our objective was to investigate the clinical usefulness of SACRA as a patient-based screening tool for identifying asthmatic patients with AR.

Methods: SACRA, ACT (Asthma Control Test), and serum IgE RAST were performed in asthmatic patients. The correlation between SACRA and other parameters were analyzed.

Results: 420 asthmatic patients were enrolled. Among 168 subjects who self-reported no concomitant AR, 76 asthmatics scored one or more symptoms on SACRA. Eventually, 32 of these 76 subjects were diagnosed with AR by physicians based on laboratory data or physical examinations by ENT specialists. The sensitivity and specificity of SACRA for the diagnosis of AR were 92% and 66% respectively. The estimated prevalence of

AR among asthmatics was 66%, almost identical to that of the previous nationwide study in Japan. The level of asthma control assessed by the VAS on SACRA and the ACT score showed a strong correlation ($r=-0.700$, $p<0.001$).

Conclusions: SACRA may be a clinically useful tool for identifying bronchial asthma patients with AR.

Key words; allergic rhinitis, bronchial asthma, asthma control test, visual analogue scale, questionnaire

Short title: SACRA for evaluation of AR in asthma

Abbreviation; ACT “asthma control test”, AR “Allergic Rhinitis”, ARIA “Allergic Rhinitis and its Impact on Asthma”, GINA “Global Initiative for Asthma”, ICS “inhaled corticosteroids”, LABA “long-acting β_2 -agonists”, LTRA “leukotriene receptor antagonists”, SACRA “Self Assessment of Allergic Rhinitis and Asthma Questionnaire”, SAR-JCP “seasonal AR caused by Japanese cedar pollinosis”, VAS “visual analogue scale”.

INTRODUCTION

Therapies for asthma have evolved since the first introduction of inhaled corticosteroids (ICS) for asthma control. Not only the increasing use of ICS or leukotriene receptor antagonists (LTRA) but also the use of asthma treatment guidelines such as GINA (Global Initiative for Asthma)¹ contributed to the significant reduction of asthma mortality in Japan for the past 20 years². Still recent surveys^{3,4} reveal that about half of the asthmatic patients are uncontrolled. Allergic rhinitis (AR) is a disease with a very high morbidity in Japan.⁵ Our increased understanding of shared pathophysiology, health impairments, and socioeconomic costs of asthma and AR⁶⁻¹⁰ has culminated in Allergic Rhinitis in Asthma (ARIA)¹⁰ guidelines, which propose a ‘one-airway’ approach that emphasizes the importance of evaluating patients with one disease for the other, and adopting a combined treatment of both upper and lower airways.

In this context, a cross-sectional nation-wide study was conducted to investigate the relationship between asthma and AR in Japan (SACRA [State of the Impact of Allergic Rhinitis on Asthma Control] study¹²). There are several indications that AR is neither routinely diagnosed nor treated in patients with concomitant asthma¹³.

SACRA (Self Assessment of Allergic Rhinitis and Asthma) Questionnaire was developed as a screening tool for identifying patients with AR among asthmatics in daily clinical practice so that physicians can propose optimal therapeutic regimens for their patients. The questionnaire from the ARIA and the GINA guidelines used in the SACRA study had excellent sensitivity and specificity, however, they had to be used in combination to obtain satisfactory results. Unfortunately, the ARIA questionnaire includes 16 items and the GINA guidelines 17 items, making them somewhat cumbersome for use in daily clinical practice. The SACRA questionnaire includes 17 items in total on one sheet of A4-size paper and is recommended for use by the Japanese Society of Allergology.

The objective of this study was to investigate the clinical usefulness of SACRA questionnaire. The primary aim of this study was to determine the comorbidity rate of AR in asthmatic patients based on rhinitis questionnaire. A secondary aim was to compare the asthma control level as evaluated by asthma questionnaire or VAS in SACRA with the Asthma Control Test (ACT) score.

METHODS

Subjects

The subjects of the study were adult outpatients of the National Center for Global Health and Medicine (Tokyo) or Kohnodai Hospital (Chiba), aged 20 years or older, with asthma and who had been treated with controller medication for more than 6 months. The diagnosis of asthma was defined as the presence of compatible clinical history and pulmonary function tests demonstrating variable airflow obstruction by means of bronchodilator responsiveness or by demonstrating bronchial hyperreactivity using methacholine challenge, which satisfied the GINA criteria¹. Patients with non-reversible lung diseases such as COPD or interstitial pneumonitis were excluded from analysis. The study was carried out from October 2011 to January 2012.

The study was approved by the Ethics Committee of the National Center for Global Health and Medicine (NCGM-G-001108-00). Use of the SACRA questionnaire, and translation into English of the Japanese original version were approved by GINA and ARIA Japan committee.

Study design

The study design was prospective, single-center, observational study. Written consent was obtained after a verbal explanation of the study. During a routine examination, the patients were asked to take an ACT survey (asthma control status for only the previous one week; ACT originally inquired for the past 4 weeks). Thereafter, patients were asked about their symptoms for perennial AR or seasonal AR and other nasal diseases such as sinusitis. In patients who reported comorbid nasal disease, a history of the use and type of rhinitis treatment was obtained. The patients were then asked to fill out the SACRA questionnaire in the presence of their physician. Patients were asked to report their worst rhinitis symptoms during the previous year while asthma symptoms were reported only for the previous week. About 5 minutes were needed to fill out both the ACT and SACRA questionnaires. After the entries were checked, blood tests (eosinophil count, IgE RIST, IgE RAST) and spirometry were performed simultaneously, except when they had been measured within the past 6 months. Antigen-specific IgE measured were as follows; house dust, *Dermatophagoides*, Japanese cedar, cypress, ragweed, Japanese mugwort, orchard grass, fungi (*Aspergillus*, *Candida*) and pets (dog, cat).

SACRA Questionnaire

The SACRA questionnaire was developed by GINA Japan Committee and ARIA Japan Committee for the purpose of evaluating asthma control and assessing the presence and type of AR in asthmatic patients (Figure S1 available as supporting information online). The asthma control questionnaire consisted of four questions (qualitative) about symptoms in the past one week to assess the asthma control level as specified by GINA and visual analogue scale (VAS) (quantitative). The VAS scores ranged from not at all bothersome (0 cm) to extremely bothersome (10 cm). The rhinitis questionnaire was developed for the purpose of physicians diagnosing AR in patients with asthma. In accordance with classifications in the ARIA guideline, the possibility of AR in patients, symptom duration, and symptom severity (qualitative) were assessed.¹⁴ AR symptoms were also evaluated quantitatively by VAS.

Diagnosis of allergic rhinitis

The diagnosis of AR was made by the criteria below, mainly based on rhinitis symptoms reported on the SACRA and serum allergen-specific IgE RAST as a reference to Japanese diagnostic criteria for AR.^{5,15}

- (1) In patients positive for ≥ 1 SACRA rhinitis symptom and ≥ 2 IgE RAST criteria, the diagnosis of AR was confirmed.
- (2) In patients with no SACRA rhinitis symptoms or negative IgE RAST (excluding patients taking anti-allergic drugs), the diagnosis of AR was excluded.
- (3) In patients with ≥ 1 SACRA rhinitis symptoms and a negative IgE RAST, other nasal diseases such as vasomotor rhinitis or sinusitis were considered. A medical history was obtained, and the presence or absence of co-existing diseases was confirmed.
- (4) In other patients with suspected AR, a final diagnosis was made by an ENT specialist based upon Japanese guideline for AR, i.e. positive results for at least two of three testing items: eosinophils in nasal discharge, IgE RAST or nasal provocation testing.

Statistical analysis

All measurement values were presented as mean $\pm$ SD. The frequencies and numbers were shown, and chi-square tests and Mann-Whitney U-tests were analyzed for subjects with and without AR. The correlation between 2 parameters such as VAS score and ACT score was analyzed by the Spearman correlation coefficient method. All analyses were performed using SAS software, version 9.2 (SAS Institute Inc., Cary, NC, USA).

RESULTS

Subjects and background

Of the 433 patients surveyed, valid responses were obtained from 420 patients. This included 185 males and 235 females, with a mean age of 57.8 ± 16.5 years old. Asthma duration was 14.5 ± 13.5 years and FEV1.0 % was $71.5\% \pm 12.7\%$. Asthma treatment included ICS/LABA combination inhaler in 281 patients (66.9%) and leukotriene receptor antagonists (LTRA) in 169 patients (40.2%). There were 175 patients (41.7%) already receiving some treatment for AR, either oral or nasal drugs (Table 1). The number of patients positive for each antigen-specific IgE was as follows; house dust 175 cases (63.2% among AR patients), *Dermatophagoides* 171 (61.7%), Japanese cedar 218 (78.7%), cypress 65 (23.5%), ragweed 35 (12.6%), Japanese mugwort 34 (12.3%), orchard grass 52 (18.8%), *Aspergillus* 30 (10.8%), *Candida* 51 (18.4%), dog 52 (18.8%), and cat 63 (22.7%).

Prevalence and severity of allergic rhinitis

The AR co-morbidity rate from patient self-reporting alone was 60% (252 cases). Based on a final diagnosis by a physician, 277 patients (66.0%) had comorbid AR. The

diagnosis of AR was based on the previously mentioned criteria, but of these, 19 patients received a final diagnosis by an ENT specialist. Sixty-one patients had self-reported sinusitis, and 34 of these patients also had AR.

On self-reporting, 168 patients reported no concomitant AR, but of these, 76 patients responded “yes” to some symptoms on SACRA, and eventually, 32 of these patients were diagnosed with AR. In other words, SACRA screening identified comorbid AR in 19% of patients who self-reported no co-existing AR. Of these 32 patients diagnosed with AR, 25 had ≥ 2 SACRA symptoms, and seven had only one symptom. Forty-one patients with only one SACRA symptom had not self-reported co-existing AR, but in 34 of these patients, AR was not diagnosed (see Fig. 1). Regarding these symptoms, 17 patients had one ocular symptom only, and 8 patients had nasal congestion with co-existing sinusitis. These two symptoms, although not significant, tended to lead to false positives when either was reported alone. Fig 2 shows the number of positive responses to each question concerning rhinitis symptoms based on the presence or absence of AR.

In contrast, of the 252 patients having self-reported co-existing AR, only seven did not have a final diagnosis of AR. Twenty three patients scored no positive items on the SACRA questionnaire, but on final diagnosis, 21 had co-existing AR. Notably, 17 of

these patients were already receiving treatment for AR and had achieved good control.

All the patients already receiving AR treatment belonged to self-reported co-existing AR group.

Based on the results described above, the usefulness of SACRA as a screening tool for diagnosing comorbid rhinitis was evaluated. When all patients with valid responses were analyzed with the cut-off value as the presence of applicable criteria, sensitivity was 92.4%, specificity was 65.7%. Subsequently when the 175 patients who were already receiving treatment for AR, which may be an important false-negative factor, were excluded, the analysis showed a sensitivity of 96.1%, specificity of 93.0%.

Correlation between ACT score and GINA asthma control level and asthma VAS

Based on the GINA control level on SACRA, 60 patients were partly controlled (1, 2 points), and 19 patients were uncontrolled (3, 4 points), for a total of 79 patients (18.8%). On the other hand, based on an ACT score <20 , 66 patients (15.7%) were not controlled. Evaluation by the GINA control level and ACT showed a correlation of $r=0.681$ ($p<0.01$). All uncontrolled patients based on the GINA control level had ACT scores ≤ 16 . (see Figure S2 available as supporting information online)

Meanwhile, 90 patients (22.0%) were partly controlled/uncontrolled based on an asthma VAS ≥ 3 . The ACT total score and asthma VAS value were strongly correlated ($r=-0.700$, $p<0.01$; Fig. 3).

DISCUSSION

We evaluated the validity of the newly developed SACRA, a simplification based on rhinitis and asthma guidelines (ARIA and GINA) that are used worldwide. The prevalence of AR based on patient self-reporting alone was 60%, whereas after screening using SACRA, the prevalence increased to 66%. The identification of comorbid AR in some patients who did not self-report co-existent AR suggests the clinical usefulness of SACRA as a screening tool.

An epidemiologic study in Japan reported an AR prevalence of 64.2% among asthmatic patients⁹. The population in that study was adult asthmatic patients from the general population, so milder patients who had not consulted medical institution were also included. On the other hand, the SACRA study,¹² which was conducted for asthmatic patients being treated at medical institutions, reported a prevalence of rhinitis

67.3%. Therefore, the 66% AR prevalence rate found in the present study, even though the subjects differed, was similar to the results of other studies.

The SACRA Questionnaire, with sensitivity 92.4% and specificity 65.7%, was not substantially inferior to the ARIA questionnaire which was utilized in the SACRA study with sensitivity 89.2% and specificity 76.7%. This was the case even though the total number of questions was reduced by half, from 33 to 17 questions. The identification of comorbid AR in 32 out of 168 patients who self-reported no co-existing AR demonstrates the usefulness of SACRA. Although 76 of the 168 patients (45%) responded “yes” to ≥ 1 SACRA symptom, the final diagnosis of AR in only 32 patients suggested a possible problem in terms of specificity. To improve the specificity, when the cut-off was set to ≥ 2 SACRA symptoms, the specificity increased to 93.0%, but the sensitivity dropped to 78.7%. Thus, establishing the cut-off as ≥ 1 SACRA symptom was considered appropriate.

The questionnaire items that were particularly related to diagnosis of AR within 5 symptoms of SACRA were examined. Although the SACRA study reported that “watery runny nose” had a particularly high specificity for rhinitis, there was no consistent trend in the present study. In addition, on analysis when patients already receiving treatment for AR were excluded, the accuracy increased, with a sensitivity of

96.1% and a specificity of 93.0%. Therefore, adding questions about rhinitis treatment and co-existing sinusitis may further improve the usefulness of SACRA.

The SACRA study¹² was a groundbreaking study in terms of first showing that about 2/3 of asthmatics have comorbid rhinitis in Japan, and that asthma control defined by GINA is significantly worse in patients with comorbid rhinitis. However, some unavoidable problems remain: it was a cross-sectional multicenter study regarding an indefinite diagnosis of rhinitis (not allergic rhinitis), there were unknown details about treatment, and their influence was unclear. Moreover, the study period was March to August 2009, which straddles February to April, a period when there is an overwhelmingly high prevalence of seasonal AR caused by Japanese cedar pollinosis (SAR-JCP), and the possibility of a difference in diagnosis rate due to this influence cannot be excluded.

VAS is currently used for many diseases, and for rhinitis VAS, its clinical usefulness, such as a correlation with the Rhinoconjunctivitis Quality of Life Questionnaire¹⁶, has already been established.^{17,18} However, the validity of the VAS in asthma has still not been proven, and in the SACRA study, it was used as an exploratory endpoint. The ACT score has been established as useful for outcomes in evaluating

asthma control,¹⁹⁻²¹ and a correlation with the GINA control level has also been reported.²² In the present study, based on an asthma VAS ≥ 3 , 90 patients were partly controlled/uncontrolled, whereas, 66 patients were not controlled based on an ACT score < 20 . Asthma VAS value was correlated with ACT score, thus suggesting the validity of using the asthma VAS.

This clinical study suggests the clinical usefulness and validity of SACRA as a tool to diagnose AR and evaluate asthma/rhinitis severity. SACRA can be used in clinical practice and we believe that the diagnosis and treatment of AR using the SACRA questionnaire may contribute to improved asthma management.

REFERENCES

1. Global Initiative for Asthma (GINA). Global strategy for asthma management and prevention: NHLBI/WHO Workshop report: National Heart, Lung and Blood Institute. National Institutes of Health, updated 2011 Available from <http://www.ginasthma.com/>
2. Suissa S, Ernst P. Use of anti-inflammatory therapy and asthma mortality in Japan. *Eur Respir J*. 2003; 21(1): 101-4.
3. Demoly P, Paggiaro P, Plaza V, Bolge SC, Kannan H, Sohler B, et al. Prevalence of asthma control among adults in France, Germany, Italy, Spain and the UK. *Eur Respir Rev*. 2009; 18(112): 105-12.
4. Adachi M, Ohta K, Tohda Y, Morikawa A, Nishima S, Mukai I. Asthma Insights and Reality in Japan 2011; AIR-J 2100. (in Japanese) *Allergology & Immunology* 2012; 19(10); 1652-70.
5. Okubo K, Kurono Y, Fujieda S, Ogini S, Uchino E, Odajima H, et al. Japanese Guideline for Allergic Rhinitis. *Allergology International*. 2011; 60; 171-89.

6. Magnan A, Meunier JP, Saugnac C, Gasteau J, Neukirch F. Frequency and impact of allergic rhinitis in asthma patients in everyday general medical practice: a French observational cross-sectional study. *Allergy*. 2008; 63(3): 292-8.
7. Stewart MG. Identification and management of undiagnosed and undertreated allergic rhinitis in adults and children. *Clin Exp Allergy*. 2008; 38(5): 751-60.
8. de Marco R, Cappa V, Accordini S, Rava M, Antonicelli L, Bortolami O, et al for the GEIRD study group. Trends in the prevalence of asthma and allergic rhinitis in Italy between 1991 and 2010. *Eur Respir J*. 2012; 39(4): 883-92.
9. Konno S, Hizawa N, Fukutomi Y, Taniguchi M, Kawagishi Y, Okada C, et al. The prevalence of rhinitis and its association with smoking and obesity in a nationwide survey of Japanese adults. *Allergy*. 2012; 67(5): 653-60.
10. Scadding G, Walker S. Poor asthma control?--then look up the nose. The importance of co-morbid rhinitis in patients with asthma. *Prim Care Respir J*. 2012; 21(2): 222-8.
11. Brozek JL, Bousquet J, Baena-Cagnani CE, Bonini S, Canonica GW, Casale TB, et al. Allergic Rhinitis and its Impact on Asthma (ARIA) 2010 revision. *J Allergy Clin Immunol* 2010; 126(3): 466-76.
12. Ohta K, Bousquet PJ, Aizawa H, Akiyama K, Adachi M, Ichinose M et al.

- Prevalence and impact of rhinitis in asthma. SACRA, a cross-sectional nation-wide study in Japan. *Allergy* 2011; 66: 1287-95.
13. Sazonov V, Ambegaonkar BM, Bolge SC, Radican L, Fan T, Taylor SD. Frequency of diagnosis and treatment of allergic rhinitis among adults with asthma in Germany, France, and the UK: National Health and Wellness Survey. *Curr Med Res Opin.* 2009; 25(7): 1721-6.
14. del Cuvillo A, Montoro J, Bartra J, Valero A, Ferrer M, Jauregui I, et al. Validation of ARIA duration and severity classifications in Spanish allergic rhinitis patients - The ADRIAL cohort study. *Rhinology.* 2010; 48(2): 201-5.
15. Fujieda S, Kuroono Y, Okubo K, Ichimura K, Enomoto T, Kawauchi H, et al. Examination, diagnosis and classification for Japanese allergic rhinitis: Japanese guideline. *Auris Nasus Larynx* 2012 ; 39(6):553-6.
16. Juniper EF, Ståhl E, Doty RL, Simons FE, Allen DB, Howarth PH. Clinical outcomes and adverse effect monitoring in allergic rhinitis. *J Allergy Clin Immunol.* 2005; 115: S390-413.
17. Bousquet PJ, Combescure C, Klossek JM, Daures JP, Bousquet J; Change in visual analog scale score in a pragmatic randomized cluster trial of allergic rhinitis. *J Allergy Clin Immunol.* 2009; 123: 1349-54.

18. Bousquet PJ, Combescure C, Neukirch F, Klossek JM, Méchin H, Bousquet J. et al. Visual analog scales can assess the severity of rhinitis graded according to ARIA guidelines. *Allergy*. 2007; 62(4): 367-72.
19. Cloutier MM, Schatz M, Castro M, Clark N, Kelly HW, Mangione-Smith R, et al. Asthma outcomes; composite scores of asthma control. *J Allergy Clin Immunol*. 2012; 129:S24-33.
20. Nathan RA, Sorkness CA, Kosinski M, Schatz M, Li JT, Marcus P et al. Development of the asthma control test: a survey for assessing asthma control. *J Allergy Clin Immunol* 2004; 113(1): 59-65.
21. Scatz M, Sorkness CA, Li JT, Marcus P, Murray JJ, Nathan RA, et al. Asthma control test; reliability, validity, and responsiveness in patients not previously followed by asthma specialists. *J Allergy Clin Immunol*. 2006; 117(3): 549-56.
22. Miedinger D, Neukomm E, Chhajed PN, Schnyder A, Naef M, Ackermann M, et al. The use of the Asthma Control Test in general practice and its correlation with asthma control according to the GINA guidelines. *Curr Med Res Opin*. 2011; 27(12): 2301-8.

Figure legends

Figure 1. Diagnosis of allergic rhinitis in patients with asthma

AR; allergic rhinitis

* patients diagnosed by ENT specialists.

Figure 2. Number of patients answering "yes" to each question of the SACRA

questionnaire about rhinitis symptom. SACRA: Self Assessment of Allergic Rhinitis and Asthma

Figure 3. Correlation between ACT score and VAS scale for asthma control on

SACRA

Spearman correlation coefficient method revealed $r=-0.700$, $P<0.01$.

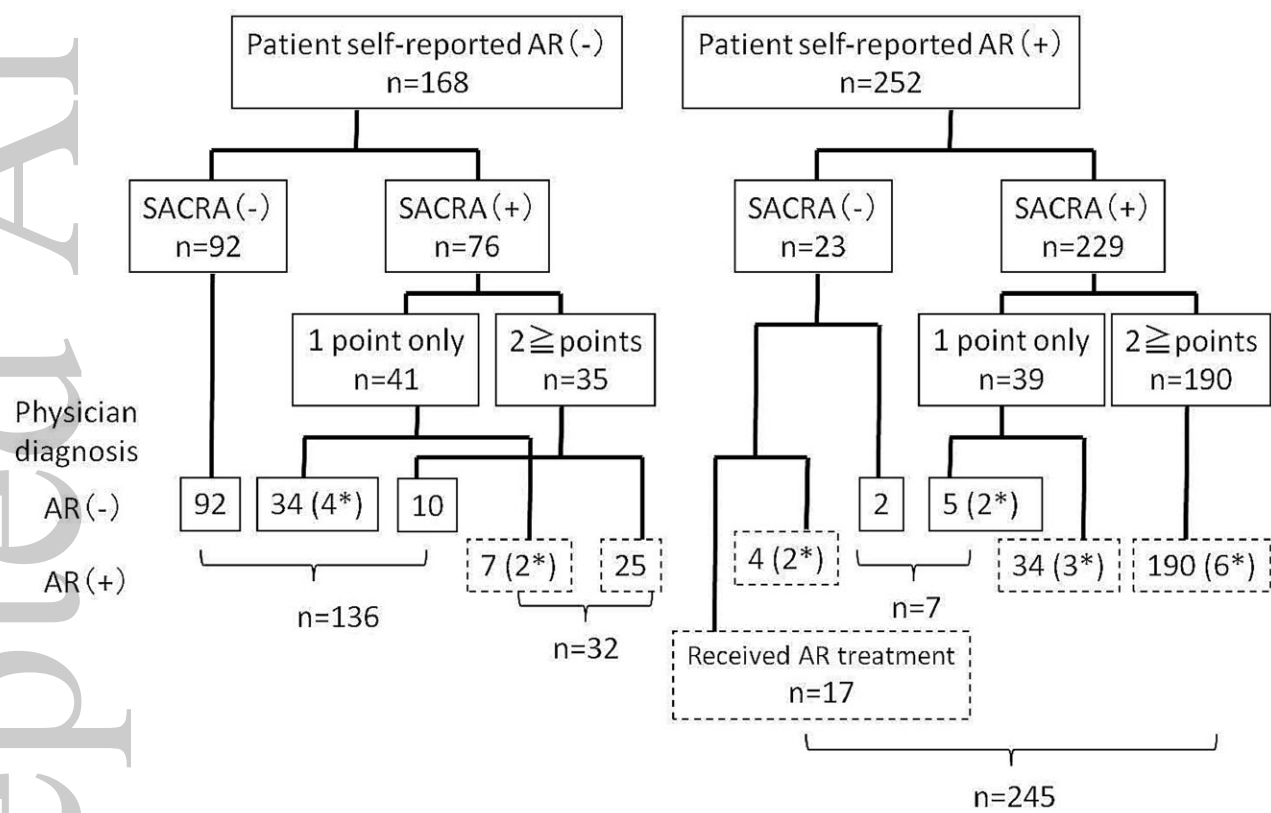
ACT: Asthma Control Test; SACRA: Self Assessment of Allergic Rhinitis and Asthma

VAS: visual analogue scale

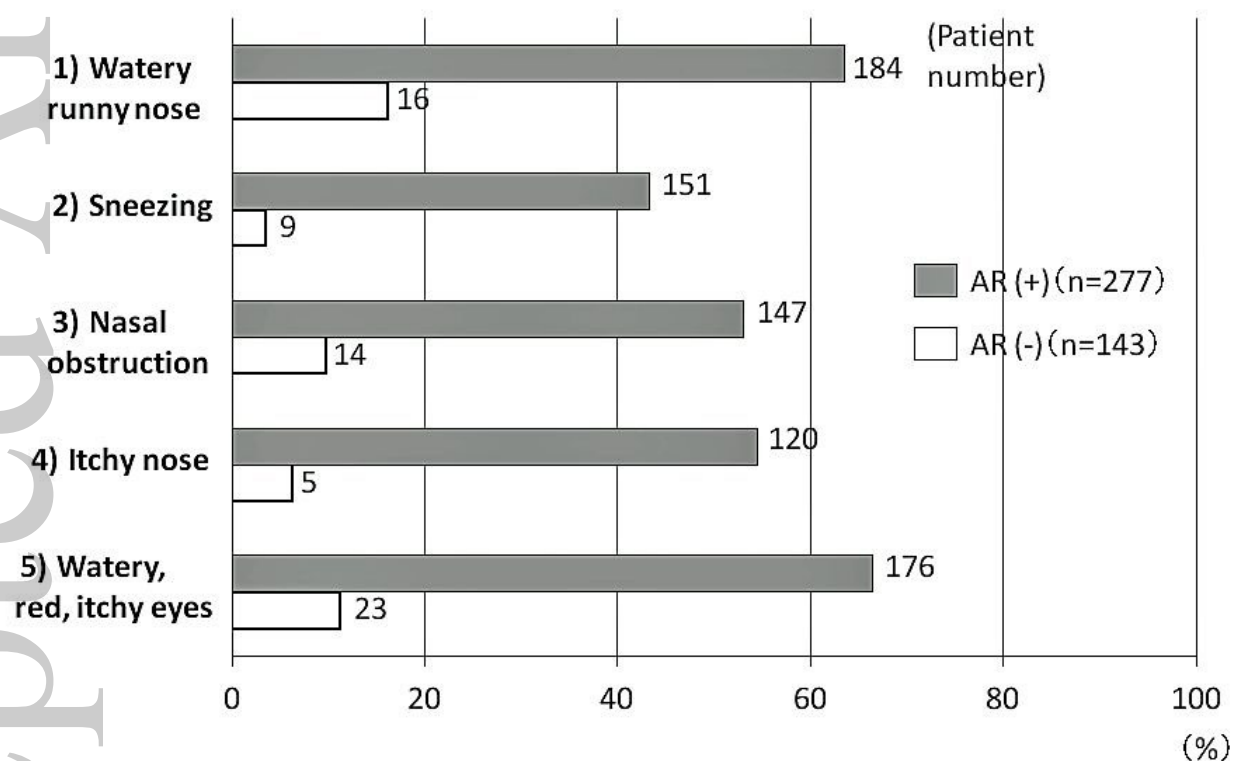
Table 1. Demographic characteristics of the patients

	All subjects	Allergic rhinitis (+)	Allergic rhinitis (-)	p value
Patients, number	420	277	143	
Age				
Mean $\pm$ SD (y)	57.8 $\pm$ 16.5	55.8 $\pm$ 16.3	61.6 $\pm$ 16.5	< 0.01 ⁺
$\geq$ 60 year old	216	130 (61.0%)	86	0.02* ⁺
< 60 year old	204	147 (72.1%)	57	
Sex				
male	185	110 (59.4%)	75	0.01 ⁺
female	235	167 (71.1%)	68	
Asthma duration (y)	14.5 $\pm$ 13.5	15.5 $\pm$ 13.7	12.9 $\pm$ 12.9	0.07* ⁺
FEV1.0 (L)	2.18 $\pm$ 0.79	2.21 $\pm$ 0.76	2.11 $\pm$ 0.85	0.02* ⁺
FEV1.0 % (%)	71.5 $\pm$ 12.7	72.8 $\pm$ 12.7	69.3 $\pm$ 12.5	0.01* ⁺
GINA treatment step				
Step 2	62	41	21	
Step 3	99	61	38	0.05 ⁺
Step 4	228	151	77	
Step 5	31	24	7	
Asthma treatment				
ICS/LABA	281 (66.9%)	185 (66.7%)	96 (67.1%)	0.88
LTRA	169 (40.2%)	123 (44.4%)	46 (32.2%)	0.03 ⁺

Data are presented as mean $\pm$ SD. P values of chi-square test and (*)Mann-Whitney U-test (⁺) statistically significant.



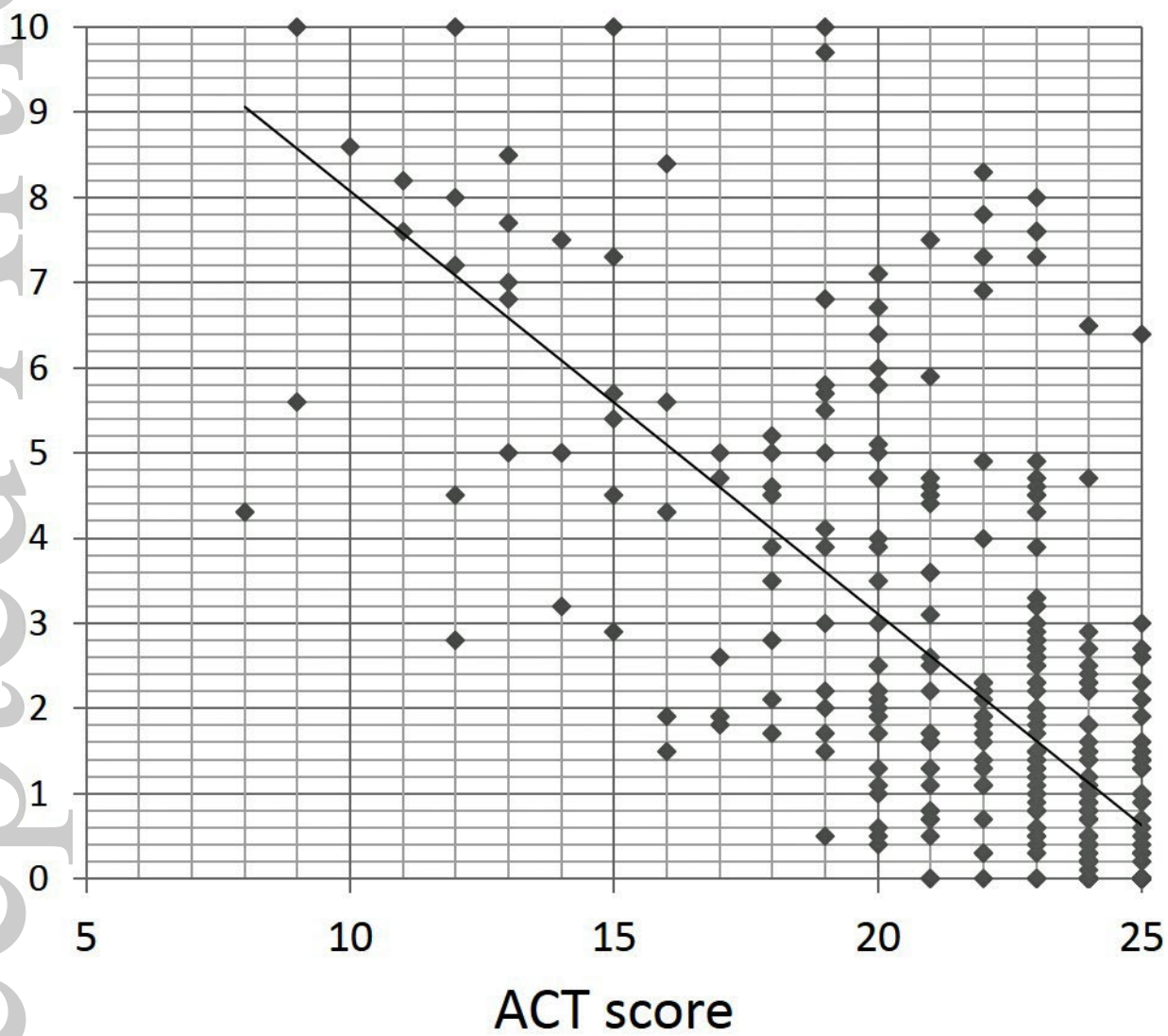
RES-12-558.R2_Figure_1_sent_to_BW.jpg



AR; allergic rhinitis

RES-12-558.R2_Figure_2_sent_to_BW.jpg

Asthma VAS scale value on SACRA



RES-12-558.R2_Figure_3_sent_to_BW.jpg

In the past week, is your asthma under control ?

you may choose one

Q 1 Have you had asthma symptoms (wheezing or whistling in your chest, shortness of breath) during the day at any time? ☐ Yes, more than 3 times ☐ Yes, once or twice ☐ No, not at all

Q 2 Have your activities at home, work, or school, or your exercise being limited by your breathing? ☐ Yes ☐ No

Q 3 Have you been awakened at night by coughing (not due to a cold), shortness of breath, or a feeling of tightness in your chest? ☐ Yes ☐ No

Q 4 How often have you had to use your rescue inhaler? ☐ More than 3 times ☐ Once or twice ☐ Not at all

Q 5 How much your asthma symptoms bother you? Not at all Very much

0 Make the appropriate on the line above to indicate how much your asthma symptoms bother you 10

In the past, do you have symptoms of allergic rhinitis?

You may choose any

Q 1 What symptoms do you have almost every day (in case intermittent, all season) more than one hour?

Watery runny nose	☐ Yes	☐ No	
Sneezing (especially violent and in bouts)	☐ Yes	☐ No	
Nasal obstruction (feeling of being unable to breathe)	☐ Yes	☐ No	
Itchy nose	☐ Yes	☐ No	
Watery, red, itchy eyes	☐ Yes	☐ No	

Q 2 How long do your symptoms last?

More than four days a week	☐ Yes	☐ No	
More than four weeks in a row	☐ Yes	☐ No	

Q 3 How do your symptoms affect you?

My symptoms disturb my sleep	☐ Yes	☐ No	
My symptoms restrict my daily activities (sports, leisure)	☐ Yes	☐ No	
My symptoms restrict my participation in school or work	☐ Yes	☐ No	
My symptoms are troublesome to me	☐ Yes	☐ No	

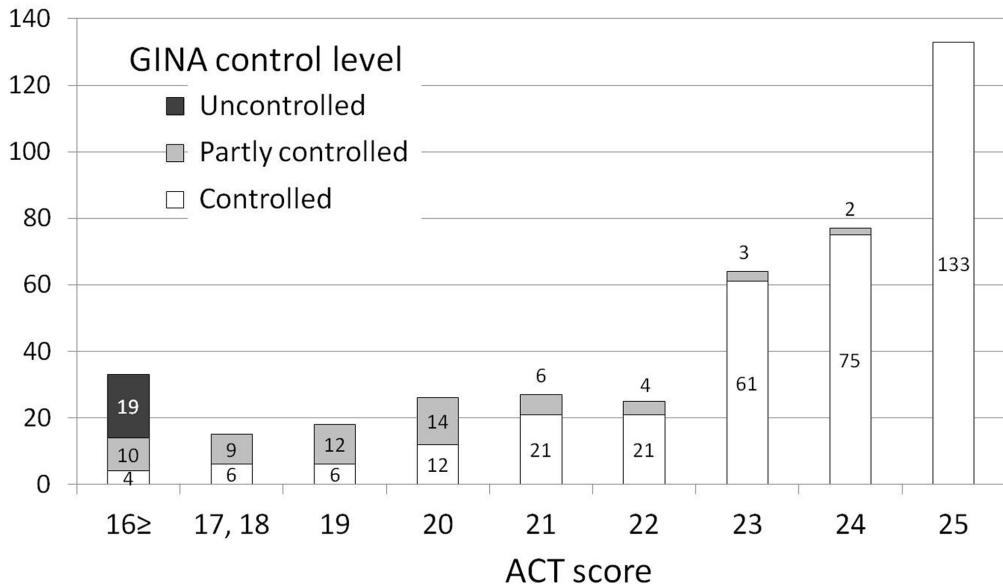
Q 4 How much your rhinitis symptoms bother you? Not at all Very much

0 Make the appropriate on the line above to indicate how much your rhinitis symptoms bother you 10

(Patient number)

GINA control level

- Uncontrolled
- Partly controlled
- Controlled



Supplementary Information

Clinical usefulness of a guideline-based screening tool for the diagnosis of allergic rhinitis in asthmatics: the SACRA (Self Assessment of Allergic Rhinitis and Asthma) Questionnaire.

Masayuki Hojo¹, Ken Ohta², Motoyasu Iikura¹, Tomonori Mizutani¹, Junko Hirashima¹, and Haruhito Sugiyama¹.

1; Division of Respiratory Medicine, National Center for Global Health and Medicine.

2; Division of Respiratory Medicine, National Hospital Organization Tokyo Hospital, Tokyo, Japan

Figure S1

SACRA (Self Assessment of Allergic Rhinitis and Asthma) Questionnaire (English translation)

Figure S2

Correlation between ACT score and GINA asthma control level. ACT: Asthma Control Test; GINA: Global Initiative for Asthma