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ORIGINAL ARTICLE

Efficacy of Using the Japanese Version of the Asthma Control Test for Determing the Level of Asthma Control in Clinical Settings

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ABSTRACT

Background: The Asthma Control Test (ACT) is frequently used for the evaluation of asthma control in clinical care setting because it does not require the use of pulmonary function tests, which can be difficult for general practitioners to use. However, few large-scale studies have investigated the efficacy of the Japanese version ACT (J-ACT) in actual use during clinical care.

Methods: The aim of this study was to analyze the efficacy of the J-ACT in a clinical care setting. Using data from a 2008 questionnaire survey including the J-ACT by the Niigata Asthma Treatment Study Group, we compared the ACT scores of 2233 patients with respect to multiple parameters, including the severity by Japanese Society of Allergology and the attack frequency. Using the definition of asthma control partially referred to Global Initiative for Asthma (GINA) guidelines from the survey data, the accuracy screening and determination of optimal ACT cutpoints were performed by retrospective analysis.

Results: Cronbach's α for the J-ACT was 0.785. Patients with more severe asthma and more frequent asthma attacks had lower ACT scores than did patients with less severe, less frequent attacks. The optimal ACT cutpoints were 24 for the controlled asthma and 20 for the uncontrolled asthma.

Conclusions: Our study, the first large-scale investigation of the efficacy of the J-ACT, determined that this evaluation tool is highly efficacious in establishing the level of asthma control. However, the determination of accurate cutpoints for the J-ACT will require more clear definitions of asthma control in future prospective studies.

KEY WORDS

ACT, asthma, control, cutpoints, efficacy

ABBREVIATIONS

ACT, Asthma Control Test; GINA, Global Initiative for Asthma; ICS, inhaled corticosteroid; IQR, interquartile range; JSA, the Japanese Society of Allergology; PEFM, peak flow meter, ER: emergency room.

INTRODUCTION

The Global Initiative for Asthma (GINA) and Japanese Society of Allergology (JSA) guidelines have promoted the progression and the improvement of asthma management.[1-3] To use these guidelines appropriately, it is extremely important to evaluate asthma control in each patient because the treatment

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strategy essentially depends on the level of asthma control.[4,5] Studies of actual clinical care have indicated that there is poor use of pulmonary function tests,[3,6-8] including forced expiratory volume at 1 second peak expiratory flow (PEF), which are required under most circumstances for proper evaluation of asthma control under these guidelines. The Asthma Control Test (ACT),[9] developed in 2004, is a simple, self-administrated, and rapidly completed assessment tool consisting of 5 questions. This tool is recognized as a superior for achieving asthma control.[10-13] One of the greatest benefits of ACT is that no respiratory function tests are required to evaluate asthma control. The ACT is thus suitable for administration using questionnaire surveys for asthmatic patients and is easy to use in the actual clinical care setting.

The Niigata Asthma Treatment Study Group has been carrying out a regular questionnaire survey on problems related to asthma management since 1998. The subjects surveyed are adult patients with bronchial asthma who visited medical institutions in Niigata Prefecture; the attending physicians of these patients are included in the survey. On the basis of these surveys, we have reported the clinical characteristics of adult bronchial asthma patients,[14] bronchial asthma in the elderly,[15] near-fatal asthma,[16] perimenstrual asthma,[17] the effect of obesity on asthma,[18] factors that exacerbate asthma,[19] the selection of inhaled corticosteriods,[20] the relationship between smoking and gender in asthmatics,[21] and changes in asthma management.[1-3]

Although the Japanese version the ACT (J-ACT) was established in 2006, there have been few large-scale reports on its the efficacy in the actual clinical care setting. In this study, the Niigata Asthma Treatment Study Group carried out a questionnaire-based survey to investigate the efficacy of the J-ACT. A retrospective analysis was performed to determine the cutpoints of the J-ACT using the results obtained from the surveys.

METHODS

Participation in this study was open to all medical institutions in Niigata Prefecture if they intended to join the Niigata Asthma Treatment Study Group. This study was performed with the approval of the Ethics Committee at the School of Medicine of Niigata University (#701) in Niigata Prefecture, Japan, or the participating institution, in accordance with the Ethical Principles for Medical Research Involving Human Subjects (Declaration of Helsinki). Written informed consent was obtained from all of the patients. The study involved 28 large hospitals (200 beds or more), 14 small hospitals (less than 200 beds), and 62 clinics (no beds). A total of 5260 questionnaires were prepared, and 3146 responses were received (response rate: 59.8%). The contents of the questionnaire were written in Japanese. The questionnaire study was performed over 2 months from September to October 2008. Subjects were adult patients (aged 16 years or more) with bronchial asthma who regularly visited the participating institutions for asthma management (typically once or twice per month). The recruited patients were asked to complete the questionnaire by themselves. Individual patients were therefore expected to understand technical terms such as "attack" in the questionnaire. This questionnaire also included the J-ACT.

In addition to the J-ACT, patients were asked about their peak flow meter (PEFM) use, smoking status, and the incidence of asthma attacks during the 2 weeks prior to answering the questionnaire. The questionnaire included questions on asthma-related symptoms during the last 2 weeks before completing the questionnaire, including those regarding cough and sputum in the morning and at night, and sleep disturbances. The patients were also asked a series of questions to evaluate their condition during the year before completing the J-ACT questionnaire. The contents of the questionnaire to each patient except the J-ACT were shown in Table 1. In addition to monitoring the completion of the questionnaire by the patient, physicians were asked to supply details on current treatment, medication used for primary control, the type of asthma (atopic or non-atopic) as indicated by total serum IgE or detection of a specific IgE for allergens, and the severity of asthma in accordance with the JSA guidelines "Asthma Prevention and Management Guideline 2006, Japan" (in Japanese). The severity by JSA guideline 2006 is defined as follows. In Step 1, appearance rate of symptoms is less than 1 time/week and no continuous medication such as inhaled corticosteroids (ICSs) is basically required. In Step 2, appearance rate of symptoms is not everyday but more than 1 time/week and low doses of ICSs is regularly required. In Step 3, appearance rate of symptoms is everyday and middle doses of ICSs and other controllers are regularly required. In Step 4, appearance rate of symptoms is everyday and activity of the daily living impaired under high doses of ICSs and other controllers.

All questionnaires were collected to the authors, and the authors calculated the ACT scores. To evaluate the efficacy of the J-ACT, the Cronbach's α value was calculated. Based on the questionnaire survey mentioned above, each patient was retrospectively evaluated with respect to the following criteria: (1) the severity of asthma based on the 2006 JSA guidelines, classified as Step1, 2, 3 and 4; (2) frequency of asthma attacks during the year before completing the questionnaire, classified as "few", "seasonal" and "persistent"; (3) the frequency of asthma attacks during the last 2 weeks before completing the questionnaire, classified as none, 1-2 times/week, 3-4 times/week and 5-7 times/week; (4) the appearance of morning and nocturnal symptoms related to asthma

Table 1 Questionnaire administered to asthmatic patients (original in Japanese)

Age: years old Gender: male / female	
Question 1	
When were you first diagnosed as having bronchial asthma? Year: Month: Day:	
Question 2	
1) Select which of the following applies to you: (I do not smoke, I am an ex-smoker, I currently smoke)	
2) If you are an ex-smoker, please answer followings:	
At what age did you start smoking?	The age you started:
At what age did you stop smoking?	The age you stopped:
How many cigarettes did you smoke per day?	Cigarettes/day (on average):
Did you stop smoking due to your asthma? Yes or No:	
3) If you currently smoke, please answer the following:	
How old were you when you started smoking?	The age you started:
How many cigarettes did you smoke per day?	Cigarettes/day (on average):
Question 3	
1) Do you use a peak-flow meter? Yes or No	
2) What was your average peak flow rate when using your meter during the last 2 weeks?	
Morning: Night:	
Question 4 Select one answer for each the following questions:	
1) How often did you have asthma attacks during the last 12 months? (frequent attacks, seasonal attacks, or few attacks)	
2) How often did you have asthma attacks during the last 2 weeks? (5-7/week, 3-4/week, 1-2/week, or none)	
3) How severe were your asthma attacks during the last 2 weeks? (impossible to move, impossible to lie down, possible to lie down, stridor, dyspnea upon exertion)	
4) Have you ever been hospitalized due to asthma? (yes/no)	
5) Have you ever been taken by ambulance or visited an emergency room due to an attack ? (yes/no)	
6) Have you ever been placed on a respirator due to an asthma attack? (yes/no)	
7) Have you ever been unconscious due to an asthma attack? (yes/no)	
8) Have you ever had an attack induced by anti-inflammatory drugs, including painkillers, antipyretics, or cold medicine?	
9) Were you absent from work or school due to an asthma attack during the last 12 months? (yes/no)	
Question 5	
How bad was your asthma during the last 2 weeks? (very good, fairly good, mediocre, slightly bad, or bad)	
Question 6	
Describe your symptoms during the last 2 weeks:	
1) In the morning (cough, sputa, chest tightness, stridor, dyspnea, or no symptoms)	
2) At night (cough, sputa, chest tightness, stridor, dyspnea, or no symptoms)	
3) Sleep disturbance (sometimes cannot fall asleep due to dyspnea, cannot have a good sleep due to dyspnea, waking up in the night due to chest tightness, or none)	
Question 7	
Do you feel satisfied with your daily life? (very satisfied, fairly satisfied, mediocre, slightly dissatisfied, or dissatisfied)	

during the last 2 weeks before completing the questionnaire, classified as symptom (-) and symptom (+); (5) the existence of sleep disturbance during the last 2 before completing the questionnaire, classified as sleep disturbance (-) and sleep disturbance (+); (6) the existence of work absenteeism during the year before completing the questionnaire; (7) emergency services required, classified as ambulance use or ER

Table 2 Background and characteristics of study participants

Cases	2233
Age (years)	54.2 ± 18.3
Gender (male/female, %)	42.5/55.9
Disease duration (years)	14.1 ± 14.0
PEFM Use (%)	26.1
Smoking status	
non-smoker (%)	52.4
ex-smoker (%)	28.7
current smoker (%)	16.3
Disease type (atopic/non-atopic, %)	67.6/26.5
Asthma attack rate during the last 2 weeks PQ (%)	25.9
Morning symptom rate during the last 2 weeks PQ (%)	43.7
Nocturnal symptom rate during the last 2 weeks PQ (%)	30.9
Sleep disturbance rate during the last 2 weeks PQ (%)	14.8
Disease severity (step 1, 2, 3, or 4 [%])	24.9, 28.8, 26.3, 5.2
Persistent symptoms during the past year PQ (%)	9.7
Work absenteeism rate during the past year PQ (%)	9.8
ICS use rate (%)	86.1
OCS use rate (%)	4.8
LABA use rate (%)	38.3
LTRA use rate (%)	43.5
OSRT use rate (%)	43.8
Ambulance use or ER visit rate (%)	32.0
Hospitalization (%)	34.4
ACT score (median [IQR])	23 [20-24]

PEFM, peak expiratory flow meter; ICS, inhaled corticosteroids; LABA, long-acting beta agonist; LTRA, leukotriene receptor antagonist; OSRT, oral sustain-released theophylline; ER, emergency room; PQ, prior to the questionnaire; ACT, Asthma Control Test; IQR, interquartile range.

visit (-) and ambulance use or ER visit (+); and (8) the need for hospitalization, classified as hospitalization (-) and hospitalization (+). Patients were divided into groups based on their responses to each category, and the ACT scores of the groups were compared and analyzed.

Because the aim of the J-ACT performance in this survey was not to evaluate the efficacy of the J-ACT but to use the J-ACT for asthma control of each patient, there was inadequate information for the established asthma control status criteria such as that by GINA 2006. The status of asthma control was tried to be defined basically according to the GINA 2006 guidelines: (1) controlled asthma, in which a patient had asthma attacks no more than 3 times/week in the frequency of asthma attacks, no morning or nocturnal symptoms related to asthma, and no sleep disturbances during the 2 weeks before answering the questionnaire; (2) uncontrolled asthma, in which a patient had asthma attacks more than 2 times/week and symptoms that included sleep disturbances or morning or nocturnal symptoms related to asthma during the 2 weeks before completing the questionnaire. Using this definition, screening performance for the J-ACT was analyzed.

Results for continuous variables, except the ACT scores, were expressed as arithmetic means and standard deviations. ACT scores were expressed as median value and interquartile ranges (IQRs). Intergroup differences in terms of continuous variables were evaluated using the Kruskal-Wallis test and Mann-Whitney U test with the Bonferroni correction. All statistical analyses were performed using the statistical software StatView 5.0 PowerPC version (SAS Institute Inc., Cary, NC, USA). For all statistical analyses, a *P*-value of <0.05 was considered to be significant.

RESULTS

PATIENT CHARACTERISTICS

Patient characteristics are summarized in Table 2. We excluded the cases that incompletely responded to both the 5 questions of the J-ACT and the 4 questions need to evaluate asthma control by our criteria. Of the 3146 asthmatic patients who completed the questionnaire, 2233 were analyzed in this study. The age (mean ± SD), gender (male/female [%]), disease duration (mean ± SD), disease type (atopic/non-atopic [%]), and the rate of peak-flow meter use were 54.2 ± 18.3 years, 42.5%/55.9%, 14.1 ± 14.0 years,

Table 3 Correlation between ACT scores and asthma severity

	Step 1	Step 2	Step 3	Step 4
Numbers of patients	557	643	587	117
ACT score (median [IQR])	24 [21-25]	23 [20-24]*	22 [19-24]*,***	21 [18-24]*,**

ACT, Asthma Control Test; IQR, interquartile range; *$p < 0.001$ vs. Step 1; **$p < 0.01$; ***$p < 0.001$ vs. Step 2.

Table 4 Correlation between ACT scores and asthma attack frequency during the last year before completing the questionnaire

	Few attacks	Seasonal attacks	Persistent attacks
Numbers of patients	971	837	217
ACT score (median [IQR])	24 [23-25]	22 [19-24]*	18 [15-21]*,**

ACT, Asthma Control Test; IQR, interquartile range; *$p < 0.001$ vs. few attacks; **$p < 0.001$ vs. seasonal attacks.

Table 5 Correlation between ACT scores and asthma attack frequency during the last 2 weeks before completing the questionnaire

	None	1-2 times/week	3-4 times/week	5-7 times/week
Numbers of patients	1654	337	129	73
ACT score (median [IQR])	24 [22-25]	20 [17-21]*	16 [13-19]*,**	15 [11-18]*,**

ACT, Asthma Control Test; IQR, interquartile range; *$p < 0.001$ vs. None; **$p < 0.001$ vs. 1-2 times/week.

67.6%/26.5% and 26.1%, respectively. Rates of nonsmokers, ex-smokers, and current smokers were 52.4%, 28.7% and 16.3%, respectively. The attack rate during the 2 weeks before answering the questionnaire was 25.9%, and rates of morning symptoms, nocturnal symptoms and sleep disturbance were 43.7%, 30.9% and 14.8%, respectively. The rates of persistent symptoms and absenteeism from work during the year before answering the questionnaire were 9.7% and 9.8%, respectively. The rate of use of ICSs was over 80%, whereas rates for use of long-acting beta agonists, leukotriene receptor antagonists, and oral sustained-released theophylline were around 40%. Oral corticosteroids were used by less than 5% of the patients. The rate of ambulance use or ER visits was 32.0%, and hospitalization was required for 34.4% of the patients. The median ACT scores [IQR] were 23 [20-24].

EFFICACY OF ACT

Cronbach's α was 0.785, indicating an acceptable internal consistency in the answers to the 5 questions of the J-ACT questionnaire. Comparing the groups with different asthma severities, the ACT scores were significantly lower in patients with Step 2, Step 3, and Step 4 than in those with Step 1 asthma; the ACT scores were significantly lower in patients with Step 3 and 4 asthma than in those with Step 2 asthma (Table 3). The ACT scores in patients with seasonal and persistent attacks were significantly lower than those in patients who experienced few attacks; the ACT scores in patients with persistent attacks were significantly lower than those in patients with seasonal attacks (Table 4). All patients who had asthma attacks 1-2, 3-4 or 5-7 times/week during the 2 weeks before completing the questionnaire had significantly lower ACT scores than those who had no asthma attacks during this period. The ACT scores of patients who had asthma attacks 3-4 and 5-7 times/week were significantly lower than those of patients who had asthma attacks 1-2 times/week during the same period (Table 5). The ACT scores were significantly lower in patients who experienced morning and nocturnal symptoms and sleep disturbances than in patients who did not (Table 6a, b, c). The ACT scores were significantly lower in patients who required ambulance use or ER visits than in those who did not (Table 7a, b). The ACT scores were significantly lower in patients who scored positive for absenteeism than in those who did not (Table 7c).

SCREENING ACCURACY AND DETERMINATION OF OPTIMAL ACT CUTPOINTS

The performance of the ACT scores for screening patients with controlled asthma is summarized in Table 8, where the ACT scores represent different proposed cutpoints. Cutpoints of <15 yielded poor ACT classification accuracy and were therefore dismissed. The Youden index reached the maximum (0.503) at an ACT score of 24; therefore, we used an ACT score of 24 as the optimal cutpoints for screening patients with controlled asthma. As seen from the ROC curve, a cutpoint of 24 represents the point closest to the left top corner (Fig. 1), yielding the lowest rates of false-positive and false-negative screening results. The screening performance of ACT scores for identifying

Table 6 Correlation between ACT scores and morning symptoms during the last 2 weeks before completing the questionnaire

a)

	Symptoms (-)	Symptoms (+)
Numbers of patients	1257	976
ACT score (median [IQR])	24 [22-25]	20 [17-23]*

ACT, Asthma Control Test; IQR, interquartile range; *$p < 0.001$ vs. Symptoms (-).

b)

	Symptoms (-)	Symptoms (+)
Numbers of patients	1543	690
ACT score (median [IQR])	24 [22-25]	19 [16-22]*

ACT, Asthma Control Test; IQR, interquartile range; *$p < 0.001$ vs. Symptoms (-).

c)

	Sleep disturbance (-)	Sleep disturbance (+)
Numbers of patients	1900	330
ACT score (median [IQR])	24 [21-25]	17 [13-20]*

ACT, Asthma Control Test; IQR, interquartile range; *$p < 0.001$ vs. Sleep disturbance (-).

Table 7

a) Correlation between ACT scores and ambulance use or ER visit

	Ambulance use or ER Visit (-)	Ambulance use or ER Visit (+)
Numbers of patients	1470	714
ACT score (median [IQR])	23 [20-25]	23 [19-24]*

ACT, Asthma Control Test; ER, emergency room; IQR, interquartile range; *$p < 0.001$ vs. Ambulance use or ER Visit (-).

b) Correlation between ACT scores and hospitalization

	Hospitalization (-)	Hospitalization (+)
Numbers of patients	1390	769
ACT score (median [IQR])	23 [20-25]	23 [19-24]*

ACT, Asthma Control Test; IQR, interquartile range; *$p < 0.01$ vs. Hospitalization (-).

c) Correlation between ACT scores and work absenteeism during the last year before completing the questionnaire

	Work absenteeism (-)	Work absenteeism (+)
Numbers of patients	1906	218
ACT score (median [IQR])	23 [20-25]	20 [16-23]*

ACT, Asthma Control Test; IQR, interquartile range; *$p < 0.001$ vs. Work absenteeism (-).

Table 8 Screening performance of ACT for identifying controlled asthma at different cutpoints

ACT score cutpoints (≤)	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Negative predictive value (%)	Youden index	Area under ROC
25	41.5	91.8	83.6	61.0	0.333	0.667
24	68.6	81.8	79.1	72.1	0.503	0.752
23	79.1	69.6	72.3	76.8	0.487	0.743
22	88.1	60.6	69.2	83.5	0.487	0.744
21	93.0	50.8	65.5	87.9	0.438	0.719
20	96.5	40.0	61.8	92.0	0.366	0.683
19	97.9	31.2	58.9	93.5	0.291	0.645
18	98.4	26.5	57.4	94.2	0.249	0.624
17	99.0	20.6	55.6	95.4	0.196	0.598
16	99.1	16.4	54.4	94.8	0.155	0.577
15	99.3	12.3	53.3	94.5	0.116	0.558

Table 9 Screening performance of ACT for identifying uncontrolled asthma at different cutpoints

ACT score cutpoints (≤)	Sensitivity (%)	Specificity (%)	Positive predictive value (%)	Negative predictive value (%)	Youden index	Area under ROC
15	39.7	96.6	51.7	94.5	0.363	0.681
16	50.3	95.3	49.5	95.4	0.445	0.728
17	58.7	93.7	46.3	96.1	0.524	0.762
18	68.3	91.0	41.3	96.9	0.593	0.797
19	75.1	88.7	38.2	97.5	0.639	0.819
20	85.7	84.2	33.4	98.5	0.699	0.850
21	90.5	76.9	26.6	98.9	0.673	0.837
22	96.8	69.4	22.6	99.6	0.662	0.831
23	97.4	59.6	18.2	99.6	0.570	0.785
24	99.5	47.4	14.9	99.9	0.469	0.734
25	100.0	27.2	11.3	100.0	0.272	0.636

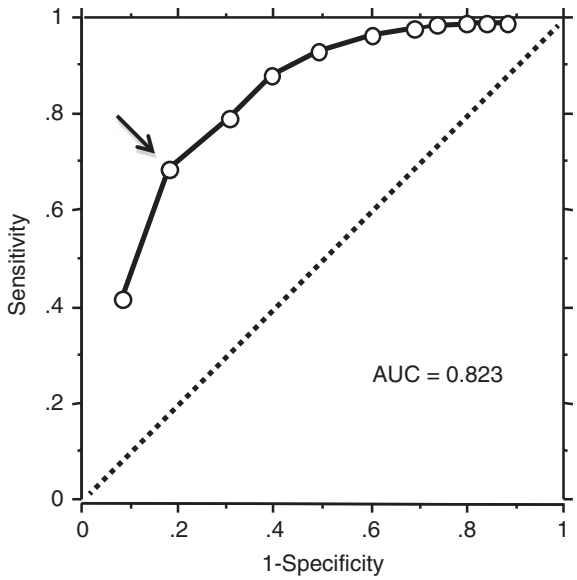

Fig. 1 ROC curve of the ACT for assessing controlled asthma. ○: cutpoints; arrow: cutpoint 24, indicating the definition of controlled asthma: a patient who had asthma attacks no more than 3 times/week, no morning or nocturnal symptoms related to asthma, and no sleep disturbances during the 2 weeks before answering the questionnaire.

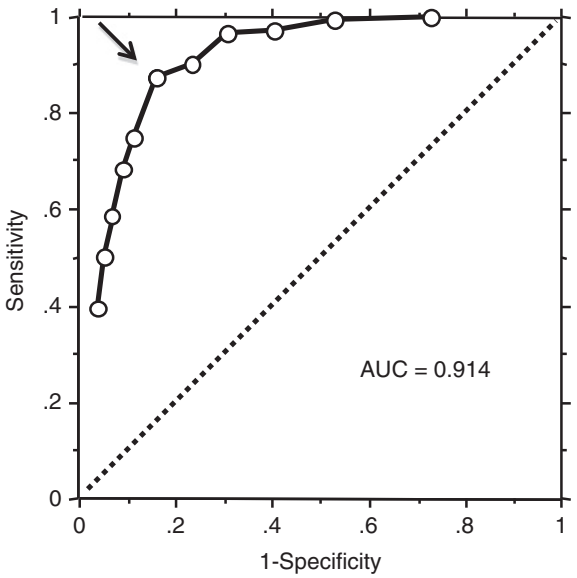

Fig. 2 ROC curve of the ACT for assessing uncontrolled asthma. ○: cutpoints; arrow: cutpoint 20, indicating the definition of uncontrolled asthma: a patient with asthma attacks more frequent than 2 times/week and symptoms that included sleep disturbance or morning or nocturnal symptoms related to asthma during the 2 weeks before completing the questionnaire.

uncontrolled asthma is summarized in Table 9. Cutpoints of <15 yielded poor ACT classification accuracy and were therefore dismissed. With the Youden index reaching the maximum of 0.699, the corresponding ACT score of 20 served as the optimal cutpoints for screening patients with uncontrolled asthma. The ROC curve demonstrates that a cutpoint of 20 represents the point closest to the top left top corner (Fig. 2). By ACT scoring, the asthma was controlled at a score of >=24 and uncontrolled at a score of =<20.

DISCUSSION

The aim of this study was to confirm the efficacy of the J-ACT in the actual clinical care. An efficacious asthma evaluation tool must enable not only asthma specialists but also general physicians to accurately assess patients with asthma. Considering a huge burden of requirement for asthma management,[22-24] it would be helpful if general physicians could play a more central role in the clinical care of these patients. The ACT was found to be one of the most suitable tools for general physicians to assess asthma control,

as guidelines such as GINA and JSA require the evaluation of respiratory function,[4,5] which general physicians found to be difficult.[6-8] The ACT is thus suitable for management of asthmatic patients by general physicians.

The value of Cronbach's α clearly showed that the J-ACT is reliable. The calculation of Cronbach's α calculation was performed even in this study because there were no published reports in English about the reliability and the validity of the J-ACT. Table 3-7 clearly demonstrates the efficacy of the J-ACT. In particular, disease severity based on JSA was determined by each patient's physician[5] (Table 3), and asthma attack frequency during the year before completing the questionnaire was self-rated by each patient (Table 4); these evaluations were completely independent of the 5 questions used in the J-ACT. These 2 results clearly confirm the validity of the J-ACT. The correlation between the J-ACT scores and ambulance use or ER visit, hospitalization and work absenteeism in Table 7 might be important in the efficacy of the J-ACT because these results can be indicate the correlation between so-called future risk and J-ACT scores.

There was 1 major limitation of this study related to the definition of controlled and uncontrolled asthma; this could have affected screening accuracy and determination of optimal ACT cutpoints. Because the analysis was retrospective, the level of asthma control was not classified at the time of the survey. Therefore, the definition of asthma control was determined according to the GINA guidelines[4] using the survey data. One item used in defining controlled asthma in this study was a lack of morning and nocturnal symptoms related to asthma and no sleep disturbances during the 2 weeks before completing the questionnaire. This item was used instead of the GINA item, indicating no nocturnal symptoms or awakening. Another item used in this study to define controlled asthma was a frequency of asthma attacks of no more than 3 times/week; this indicator was used instead of the GINA item, specifying that the frequency of asthma symptoms in the daytime be no more than 3 times/week. Additionally, there were no further items concerning each patient's condition and no evaluation of respiratory function in our definition of asthma control. Therefore, the number of cases of controlled asthma determined by this definition may have been overestimated compared to that determined using GINA guidelines. In that case, some uncontrolled patients according to the GINA definition could have been classified as controlled by our definition; this discrepancy between the 2 definitions might affect the determination of the optimal cutpoints for the ACT.

Although there were no established cutpoints for controlled asthma, the ACT score was often used as a tool for the detection of controlled asthma when the cutpoint was 20 for the J-ACT. This implies that management of asthma should not be changed when the ACT score is >=20. Studies have proposed that the cutpoint of 20 for ACT corresponds to the strategy of asthma management as put forth in the GINA and JSA guidelines.[4,5] However, the results of our analysis indicate that it would be better to use a score of 24 rather than a score of 20 as a cutpoint to achieve complete control of asthma using all conventional medicines under these guidelines. Use of 20 as a cutpoint might be against the strategy of asthma management proposed by GINA or JSA. Given the difference in definitions of "controlled asthma" as mentioned above, a cutpoint above 24 might be necessary as an adequate cuopoint for controlled asthma, and a cutpoints of 20 should not be used for controlled asthma. On the other hand, we propose another method for using these guidelines. If the cutpoints for the J-ACT was used only for the detection of uncontrolled asthma, a cutpoint of 20 is likely to be suitable. To determine the cutpoints for the J-ACT, a prospective study using an established definition of asthma control will be required.

In summary, we established the efficacy of the J-ACT using a questionnaire survey; the J-ACT eliminated the need for respiratory function tests and was suitable for use by general physicians administering clinical care. This study is the first large-scale investigation to report of the efficacy of the J-ACT. However, there was a disadvantage in assigning cutpoints in the J-ACT. Although cutpoints of 24 and 20 were indicated for controlled asthma and uncontrolled asthma, respectively, a further prospective study using an established definition for asthma control based on GINA or JSA will be required for definitive establishment of cutoff values.

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