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ORIGINAL ARTICLE

Comparison of the Asthma Health Questionnaire-33-Japan and the Short-Form 36-Item Health Survey for Measuring Quality of Life in Japanese Patients with Asthma

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ABSTRACT

Background: The Asthma Health Questionnaire (AHQ)-Japan is useful for assessing quality of life (QOL) in Japanese patients with asthma. However, no studies have compared the AHQ-Japan to other QOL instruments.

Methods: The AHQ-33-Japan and the Medical Outcomes Study Short-Form 36-Item Health Survey (SF-36) were completed simultaneously by 126 Japanese patients with asthma (48 men, 78 women; 58.1 ± 17.3 years of age), and the data were compared.

Results: Poor negative correlations (correlation coefficient (r) = −0.20 to −0.44, $P < 0.05$) were observed for 38 combinations of the subscales of these QOL instruments. As the severity of the patients' asthma increased, the scores of most subscales of both QOL instruments became worse. However, the AHQ-33 was more sensitive for severity than the SF-36. On logistic regression analysis, high Asthmatic Symptoms, Factors which Worsened Symptoms, Emotion, Daily Activity, and Social Activity subscale scores, as well as a high total 32-item score, of the AHQ-33 were associated with an increased risk of moderate to severe asthma. On the other hand, only the Physical functioning subscale score of the SF-36 was associated with an increased risk of moderate to severe asthma.

Conclusions: Our results show that the AHQ-33 is useful as a disease-specific QOL instrument in Japanese patients with asthma and that it is better than the SF-36, which is a generic QOL instrument. In the future, the AHQ-33 should be compared to other asthma-specific questionnaires.

KEY WORDS

asthma, Asthma Health Questionnaire (AHQ)-Japan, Japanese, quality of life, questionnaire

INTRODUCTION

Asthma is a chronic disease that requires long-term management and has a major effect on patients' activities of daily living. Since asthma is recognized as a disease of the airways, anti-inflammatory drugs, primarily inhaled corticosteroids, are recommended, and guidelines for the diagnosis and treatment of asthma have been formulated.[1] To determine whether asthma patients' health status is stable, it is necessary to evaluate their quality of life (QOL), which includes not only subjective symptoms, peak expiratory flow (PEF), and spirometry, but also the patients' economic burden and their feeling of satisfaction. The Medical Outcomes Study Short-Form 36-Item Health Survey (SF-36)[2-4] is now widely used as a generic health-related quality of life (HRQOL) questionnaire. The validity and reliability of the SF-36

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have also been reported in asthma,[2,5] and the SF-36 has also been used as an assessment tool in many QOL studies of asthma patients.[6-9]

The Asthma Health Questionnaire (AHQ) was originally developed as the AHQ-37, which included 36 items and a Face Scale;[10,11] it is a disease-specific HRQOL questionnaire that was developed in Japan. The AHQ-37 has been shown to have clinical validity, and it is also reliable and valid for discriminative purposes; thus, it can be used with confidence in clinical research.[10] However, the AHQ-33 is now widely used, since 4 inappropriate items were eliminated by multitrait analysis.[11] The AHQ-33 has 6 subscales (Asthmatic Symptoms, Factors which Worsened Symptoms, Emotion, Daily Activity, Social Activity, and Economics), which consist of a total of 32 items (graded 0 to 4), and 1 Face Scale (graded 1 to 5). A higher score on the AHQ-33 reflects a worse health status with respect to these 33 items, which is the opposite of the SF-36 subscales, where a lower score reflects a worse health status. We have also confirmed the validity of the AHQ-33 in an extensive study of Japanese asthma patients (data not shown).

No studies have compared the AHQ with other QOL instruments. In the present study, the QOL of asthma patients in Japan was assessed using the AHQ-33 and the SF-36. The aim was to identify which HRQOL disorders cannot be identified by the SF-36 as a generic QOL instrument but can be identified by the AHQ-33 as a disease-specific QOL instrument.

METHODS

One hundred and forty-nine Japanese patients (67 men, 82 women; 60.1 ± 17.3 years of age) at the Hashimoto Municipal Hospital were enrolled. All participants were required to have been diagnosed as having asthma by a respiratory physician. The exclusion criteria included: 1) age <15 years; 2) COPD or other respiratory diseases; and 3) malignant diseases, cardiac diseases, severe liver dysfunction, severe renal dysfunction, hematological diseases, psychiatric diseases, or dementia. COPD was diagnosed clinically based on exposure to particles, such as a 10-pack-year history of tobacco use, emphysema on chest CT, and other factors. Patients were required to understand written Japanese in order to be able to complete the questionnaires and to give their written informed consent, which indicated that they understood the aim and methods of this clinical study, and that there would be no disadvantages if they chose not to participate. This clinical study was approved by the Ethics committee of the Hashimoto Municipal Hospital, Hashimoto, Japan, and conformed to the principles outlined in the Declaration of Helsinki.

The data of 126 patients were used for the final validation. Asthma severity was classified according to the Global Initiative for Asthma (GINA) guidelines.[1] Etiology was classified based on the presence of antigen-specific IgE; patients with antigen-specific IgE were diagnosed as having atopic asthma. Morning and evening PEFs were determined based on the mean values obtained 7 days before the questionnaire survey was completed; the results are reported as the percentage of the predicted value.[12]

The AHQ-33-Japan and the SF-36 v2™ Health Survey (Japanese version) were completed during the same session. The correlations between the subscales of the two QOL instruments and the relationships between their subscales and disease severity were evaluated.

STATISTICAL ANALYSIS

Spearman's correlation coefficient was used to analyze relationships between two variables, and differences between score means were assessed using the Steel-Dwass method. The odds ratio (OR) and the 95% confidence interval (CI) were estimated based on the logistic model; they were used to measure the strength of the association between disease severity and each subscale. They refer to the relative risk associated with moderate to severe asthma for higher scores (more than the mean score of each subscale) compared to lower scores. Data are reported as mean ± standard deviation (SD) values, and a p value < 0.05 was considered significant. However, even if the p value was < 0.05, a correlation coefficient (r) of 0 to ± 0.2 was considered to indicate no correlation.

RESULTS

There were 126 subjects (48 men, 78 women) with a mean age of 58.1 ± 17.3 years (range: 16–88). The mean serum IgE level was 338.1 ± 763.8 IU/ml (n = 97); 52.3% (n = 56) of patients had atopic asthma, and 47.7% (n = 51) had non-atopic asthma. According to the GINA classification,[1] 9.5% (n = 12) of patients had intermittent asthma, 24.6% (n = 31) had mild persistent asthma, 38.9% (n = 49) had moderate persistent asthma, and 27.0% (n = 34) had severe persistent asthma. Subjects with a past history of childhood asthma accounted for 13.7% (16/117) of the patients, while 20.6% (26/126) had allergic rhinitis, and 12.9% (16/124) of the patients were ex- or current smokers. Thirty-seven patients were monitored using a peak flow meter and had analyzable peak expiratory flow (PEF) data; their morning %PEF was 78.6% ± 19.8%, and their evening %PEF was 81.4% ± 18.2%.

The AHQ-33 and the SF-36 subscale scores are shown as histograms and box and whisker plots in Figures 1, 2. The box and whisker plots are shown with quartiles, with the boxes indicating the interquartile ranges (25–75%), the lines within the boxes indicating the medians, and the diamonds indicating the sample means and the 95% confidence intervals. In addition, the overall distribution is shown in terms of the minimum, 2.5%, 10%, 90%, 97.5%, and the maximum quartiles. The score distribution was more bi-

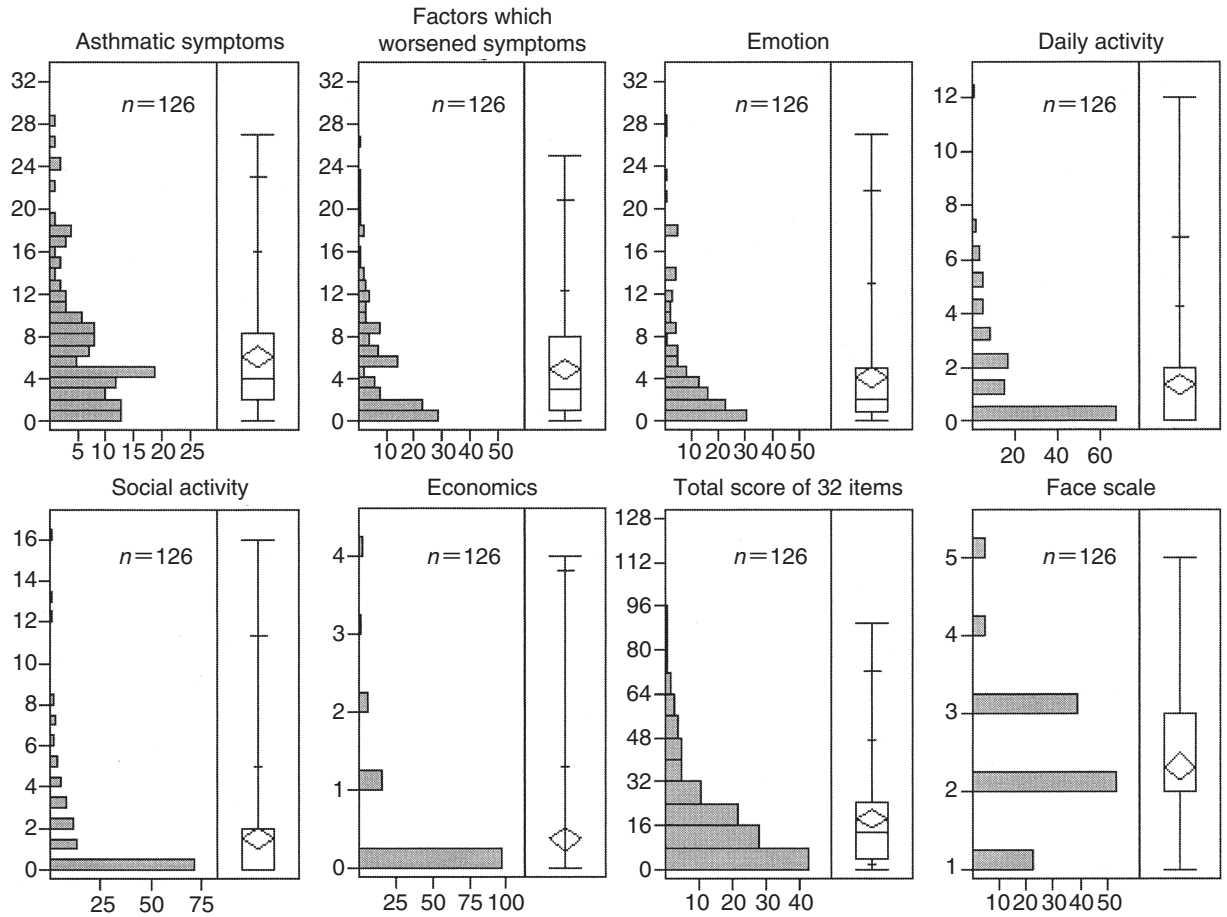

Fig. 1 The distribution of the AHQ-33 subscale scores. The distribution of each subscale score is shown by a histogram and a box and whisker plot. The ranges for the original scores on each subscale are shown on the vertical axes. The horizontal axes show the frequency.

ased for the AHQ-33 than for the SF-36. The response rates were high (100% for the AHQ-33 and 99.5% for the SF-36), and there was some variability in the distribution. Of the 6 subscales other than the Face Scale, the Asthmatic Symptoms subscale had the highest score on the transformed 0–100 score on the AHQ-33 (19.4 ± 18.2), and the General health subscale had the lowest score on the SF-36 (50.6 ± 19.1).

Correlations between all combinations of the AHQ-33 subscales and the SF-36 subscales were examined due to the interscale correlation of each HRQOL instrument and the cross-over of the question item contents between these two instruments (Table 1). Poor negative correlations ($r = -0.20$ to -0.44, $P < 0.05$) were observed between the subscales of these two instruments for 38 combinations: Asthmatic Symptoms of the AHQ-33 correlated with Physical functioning, General health, Vitality, and Mental health of the SF-36; Factors which Worsened Symptoms correlated with Physical functioning and Vitality; Emotion correlated with General health, Vitality, Social functioning, and Mental health; Daily Activity correlated with Physical functioning, Role-physical, Bodily pain, General health, Vitality, and Social functioning; Social Activity correlated with Physical functioning, General health, Vitality, Social functioning, Role-emotional, and Mental health; Economics correlated with Vitality, Social functioning, and Mental health; the total 32-item score correlated with Physical functioning, General health, Vitality, Social functioning, and Mental health; and the Face Scale correlated with all subscales.

The subscale scores on the two HRQOL questionnaires are shown in Table 2 by severity. With worsening severity, each subscale score of the AHQ-33 increased, except for the Economics and Face Scale. The Asthmatic Symptoms, Factors which Worsened Symptoms, Emotion, and Daily Activity subscale scores, as well as the total 32-item score, were significantly higher in patients with moderate to severe disease. As disease severity worsened from mild persis-

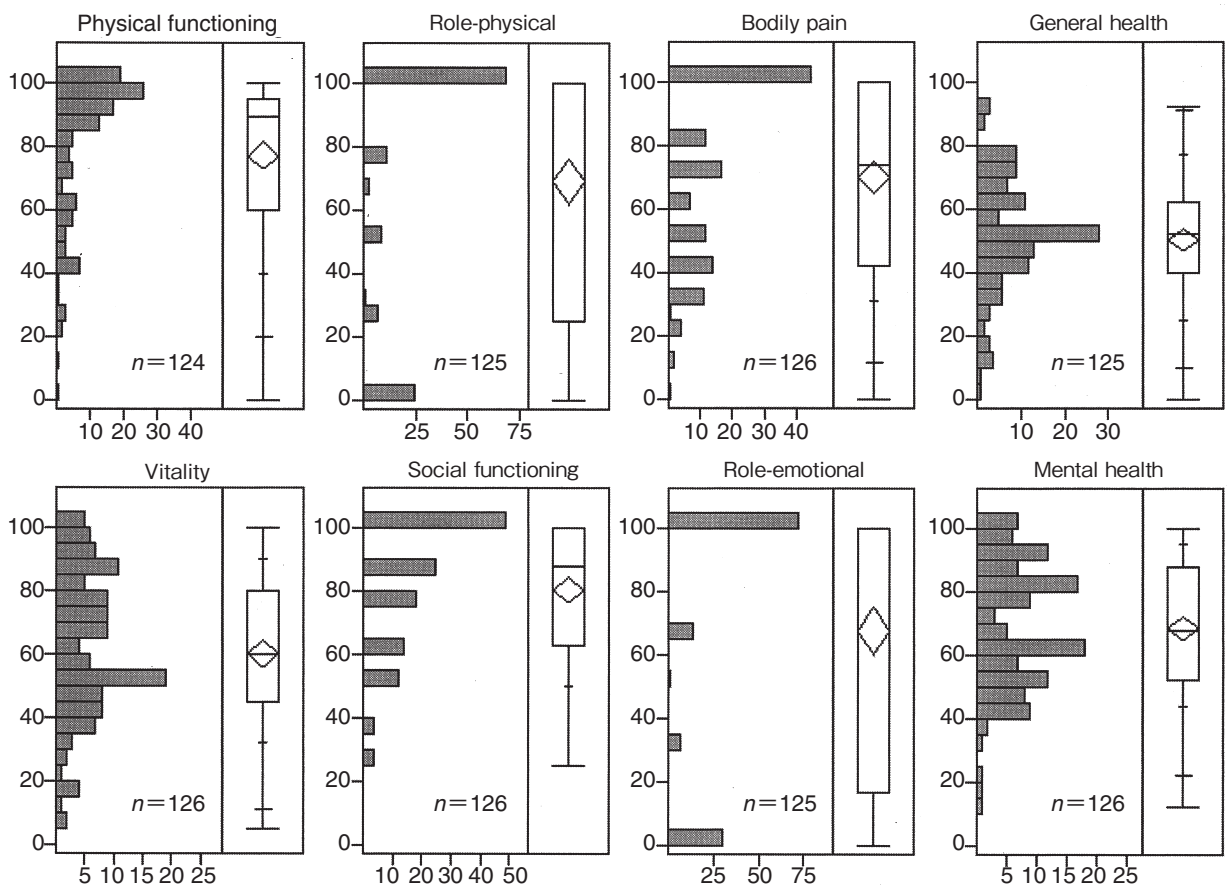

Fig. 2 The distribution of the SF-36 subscale scores. The distribution of each subscale score is shown by a histogram and a box and whisker plot. The vertical axes and the horizontal axes show the subscale scores/100 and the frequency, respectively.

tent to severe, most SF-36 subscale scores decreased. The Physical functioning and Bodily pain subscale scores were significantly lower in patients with severe persistent asthma than in those with mild persistent asthma. However, all SF-36 subscale scores were lower in patients with intermittent asthma than in those with mild persistent asthma, but the differences were not statistically significant. Logistic regression was also used to evaluate the relationship between asthma severity and the scores of the two HRQOL instruments (Table 3). High Asthmatic Symptoms, Factors which Worsened Symptoms, Emotion, Daily Activity, and Social Activity subscale scores, as well as a high total 32-item score, of the AHQ-33 (=mean level) were associated with an increased risk of moderate to severe asthma (OR (95% CI) = 3.88 (1.67 to 9.90), 3.21 (1.48 to 7.32), 3.31 (1.32 to 9.54), 3.94 (1.65 to 10.58), 2.75 (1.17 to 7.03), and 3.69 (1.59 to 9.43), respectively, $p < 0.05$), whereas only a low Physical functioning subscale score of the SF-36 was associated with an increased risk of moderate to severe asthma (OR (95% CI) = 2.47 (1.08 to 6.10), $p < 0.05$).

The correlations between the two HRQOL instruments' subscales and morning %PEF or evening %PEF are shown in Table 4. Morning %PEF correlated with the Factors which Worsened Symptoms and Daily Activity subscale scores, as well as the total 32-item score, of the AHQ-33 ($r = -0.33$ to -0.48, $p < 0.05$), and evening %PEF correlated with the Daily Activity subscale score ($r = -0.38$, $p < 0.05$). On the other hand, Morning %PEF correlated with 4 SF-36 subscales, and evening %PEF correlated with 2 SF-36 subscales.

DISCUSSION

More accurate methods of measuring morbidity, such as QOL measurements, are needed. Asthma is a chronic disorder that can place considerable restrictions on the physical, emotional, and social aspects of patients' lives and may affect their careers. Asthma patients may often be absent from school or work.[1]

To measure QOL in patients with asthma, the Nottingham Health Profile with 45 items and the SF-36 are now widely used and have been validated. The SF-36 Health Status Questionnaire is based on 36 items selected to represent 8 health concepts. A

Table 1 The correlation between subscales of AHQ-Japan and SF-36

		r	*p* value	r	*p* value	r	*p* value	r	*p* value
		AS vs.		FWS vs.		Em vs.		DA vs.	
SF-36	PF	− 0.29	< 0.01†	− 0.20	0.02†	− 0.20	0.03	− 0.43	< 0.01†
	RP	− 0.15	0.09	− 0.11	0.23	− 0.10	0.26	− 0.21	0.02†
	BP	− 0.16	0.07	− 0.11	0.22	− 0.12	0.18	− 0.27	< 0.01†
	GH	− 0.31	< 0.01†	− 0.18	0.04	− 0.32	< 0.01†	− 0.33	< 0.01†
	VT	− 0.31	< 0.01†	− 0.25	< 0.01†	− 0.22	0.01†	− 0.27	< 0.01†
	SF	− 0.16	0.07	− 0.14	0.12	− 0.22	0.01†	− 0.26	< 0.01†
	RE	− 0.13	0.14	− 0.09	0.29	− 0.06	0.50	− 0.15	0.10
	MH	− 0.21	0.02†	− 0.20	0.03	− 0.27	< 0.01†	− 0.17	0.06

		r	*p* value	r	*p* value	r	*p* value	r	*p* value
		SA vs.		Ec vs.		Total sore of 32 items vs.		Face scale vs.	
SF-36	PF	− 0.22	0.01†	− 0.07	0.46	− 0.31	< 0.01†	− 0.25	< 0.01†
	RP	− 0.15	0.10	− 0.03	0.78	− 0.14	0.11	− 0.25	< 0.01†
	BP	− 0.14	0.12	− 0.10	0.25	− 0.17	0.06	− 0.33	< 0.01†
	GH	− 0.25	< 0.01†	− 0.13	0.14	− 0.32	< 0.01†	− 0.41	< 0.01†
	VT	− 0.21	0.02†	− 0.20	0.02†	− 0.31	< 0.01†	− 0.43	< 0.01†
	SF	− 0.26	< 0.01†	− 0.25	< 0.01†	− 0.22	0.01†	− 0.34	< 0.01†
	RE	− 0.21	0.02†	− 0.07	0.42	− 0.13	0.16	− 0.23	< 0.01†
	MH	− 0.28	< 0.01†	− 0.23	< 0.01†	− 0.25	< 0.01†	− 0.44	< 0.01†

r, correlation coefficient; AS, Asthmatic symptoms; FWS, Factors which worsend symptoms; Em, Emotion; DA, Daily activity; SA, Social activity; Ec, Economics; PF, Physical functioning; RP, Role-physical; BP, Bodily pain; GH, General health; VT, Vitality; SF, Social functioning; RE, Role-emotional; MH, Mental health.

†: $p < 0.05$ except r of 0 to ± 0.2.

Table 2 Scores of subscales in AHQ-Japan and SF-36 according to severity

AHQ-Japan severity	AS	FWS	Em	DA	SA	Ec	Total score of 32 items	Face scale
Intermittent	1.9	1.3	0.6	0.2	0.7	0.3	4.8	2.3
	± 1.8	± 2.3	± 0.9	± 0.6	± 2.0	± 0.9	± 4.3	± 0.8
Mild persistent	5.3	4.4	3.2	0.8	1.2	0.2	15.2	2.3
	± 5.2	± 5.4	± 4.5	± 1.7	± 2.6	± 0.6	± 17.1	± 1.1
Moderate persistent	6.2†	5.1	4.8†	1.5	1.7	0.5	19.8†	2.3
	± 6.2	± 5.9	± 5.8	± 2.3	± 2.9	± 1.1	± 20.3	± 1.0
Severe persistent	8.5†§	6.5†	5.3†	2.1†§	2.0	0.4	24.7†§	2.4
	± 5.9	± 5.4	± 6.6	± 2.1	± 2.9	± 0.7	± 19.4	± 0.9

SF-36 severity	PF	RP	BP	GH	VT	SF	RE	MH
Intemittent	80.8	63.9	67.7	49.9	59.9	82.3	58.3	67.1
	± 16.1	± 39.0	± 25.8	± 12.3	± 25.0	± 13.5	± 45.2	± 24.5
Mild persistent	85.2	76.6	80.9	58.3	64.8	87.9	82.3	72.3
	± 20.2	± 39.2	± 22.1	± 15.8	± 20.1	± 13.9	± 33.6	± 17.6
Moderate persistent	79.5	67.9	72.5	48.8	62.6	80.4	62.6	69.0
	± 23.3	± 40.3	± 28.2	± 21.7	± 25.1	± 23.8	± 44.9	± 21.5
Severe persistent	66.1§¶	64.1	57.9§	46.5	53.8	73.9	63.6	65.4
	± 27.1	± 43.3	± 30.0	± 18.4	± 22.5	± 23.1	± 44.4	± 19.1

AS, Asthmatic symptom; FWS, Factors which worsened symptoms; Em, Emotion; DA, Daily activity; SA, Social activity; Ec, Economics; PF, Physical functioning; RP, Role-physical; BP, Bodily pain; GH, General health; VT, Vitality; SF, Social functioning; RE, Role-emotional; MH, Mental health.

Data are expressed as mean ± standard deviation (SD) values. †: $p < 0.05$ vs. Intermittent, §: $p < 0.05$ vs. Mild persistant, ¶: $p < 0.05$ vs. Moderate.

Table 3 Odds ratio (95%CI) for moderate to severe asthma by subscales of AHQ-Japan or SF-36

AHQ-Japan subscales	OR (95%CI)	*P* value	SF-36 subscales	OR (95%CI)	*P* value
AS			PF		
< mean	3.88 (1.67 − 9.90)	< 0.01†	≥ mean	2.47 (1.08 − 6.10)	0.04†
≥ mean			< mean		
FWS			RP		
< mean	3.21 (1.48 − 7.32)	< 0.01†	≥ mean	1.47 (0.68 − 3.32)	0.33
≥ mean			< mean		
Em			BP		
< mean	3.31 (1.32 − 9.54)	0.02†	≥ mean	1.65 (0.78 − 3.60)	0.19
≥ mean			< mean		
DS			GH		
< mean	3.94 (1.65 − 10.58)	< 0.01†	≥ mean	1.50 (0.71 − 3.21)	0.28
≥ mean			< mean		
SA			VT		
< mean	2.75 (1.17 − 7.03)	0.03†	≥ mean	1.18 (0.56 − 2.48)	0.66
≥ mean			< mean		
Ec			SF		
< mean	2.22 (0.87 − 6.49)	0.11	≥ mean	1.50 (0.71 − 3.27)	0.30
≥ mean			< mean		
Total score of 32 items			RE		
< mean	3.69 (1.59 − 9.43)	< 0.01†	≥ mean	1.61 (0.76 − 3.51)	0.22
≥ mean			< mean		
Face scale			MH		
< mean	1.30 (0.61 − 2.83)	0.51	≥ mean	1.36 (0.65 − 2.87)	0.41
≥ mean			< mean		

AS, Asthmatic symptom; FWS, Factors which worsened symptoms; Em, Emotion; DA, Daily activity; SA, Social activity; Ec, Economics; PF, Physical functioning; RP, Role-physical; BP, Bodily pain; GH, General health; VT, Vitality; SF, Social functioning; RE, Role-emotional; MH, Mental health.

† : $p < 0.05$.

Table 4 The correlation between subscales of AHQ-Japan or SF-36 and %PEF

Subscale	*n*	r	*p* value	Subscale	*n*	r	*p* value
Morning %PEF vs.				Evening %PEF vs.			
AS	37	− 0.22	0.20	AS	37	− 0.14	0.40
FWS	37	− 0.33	0.04†	FWS	37	− 0.28	0.10
Em	37	− 0.28	0.09	Em	37	− 0.22	0.19
DA	37	− 0.48	< 0.01†	DA	37	− 0.38	0.02†
SA	37	− 0.18	0.29	SA	37	− 0.16	0.33
Ec	37	− 0.09	0.59	Ec	37	− 0.07	0.67
Total score of 32 items	37	− 0.34	0.04†	Total score of 32 items	37	− 0.28	0.10
Face scale	37	− 0.17	0.32	Face scale	37	− 0.05	0.76
PF	36	0.37	0.03†	PF	36	0.28	0.09
RP	37	0.45	< 0.01†	RP	37	0.42	< 0.01†
BP	37	0.28	0.09	BP	37	0.23	0.17
GH	37	0.36	0.04†	GH	37	0.25	0.13
VT	37	0.15	0.39	VT	37	0.10	0.54
SF	37	0.38	0.02†	SF	37	0.34	0.04†
RE	37	0.21	0.22	RE	37	0.20	0.25
MH	37	0.16	0.35	MH	37	0.14	0.42

r, correlation coefficient; AS, Asthmatic symptom; FWS, Factors which worsened symptoms; Em, Emotion; DA, Daily activity; SA, Social activity; Ec, Economics; PF, Physical functioning; RP, Role-physical; BP, Bodily pain; GH, General health; VT, Vitality; SF, Social functioning; RE, Role-emotional; MH, Mental health.

† : $p < 0.05$ except r of 0 to ± 0.2.

study was carried out using the SF-36 in asthma patients with disease of varying severity; it was found that most items were correlated with the severity of asthma,[5] which suggests that such scales may be useful for comparing different populations. The SF-36 (Japanese version) was translated and updated, and it has been widely used in Japan.[13,14] The information obtained from the SF-36 is important.

The AHQ-33-Japan was developed by the Japanese Society of Allergology to evaluate HRQOL. In this study, HRQOL was assessed in Japanese asthma patients using the AHQ-33 as a disease-specific HRQOL instrument and the SF-36 as a generic HRQOL instrument. Then, their results were compared to establish the validity of the AHQ-33.

The present results showed a bias in the score distribution of the AHQ-33 and indicated a floor effect. Although this may have been due to the fact that most patients had symptoms that had stabilized, little bias was observed in the distribution of the SF-36. The cause of this difference is unclear, though the patients may have had certain restrictions.

Although the response rates were excellent for both instruments, there were a few non-responses with the SF-36. In the correlation between the subscales of the AHQ-33 and the SF-36, the SF-36 subscales correlated best with the AHQ-33 Face Scale. The Face Scale expresses global QOL functioning.[10] This may explain why there were more correlations between subscales of the SF-36 as a generic HRQOL instrument and the Face Scale.

In the present study, it was found that the scores of both QOL instruments worsened as disease severity increased. However, the relationship between an increase in the AHQ-33 subscale scores and worsening disease severity (from intermittent to severe) was more direct than the relationship between a decrease in the SF-36 subscale scores and worsening severity. In addition, the odds ratios estimated using the logistic model showed that lower scores in most of the AHQ-33 subscales were associated with an increased risk of moderate to severe asthma. Therefore, the AHQ-33 appears to be more useful and to more accurately reflect disease severity than the SF-36 when evaluating QOL in Japanese asthma patients. On the other hand, although several subscales of the AHQ-33 and the SF-36 correlated with morning %PEF, the correlation coefficients were low. Lung function data are often used to evaluate disease severity and treatment effects, but they are poorly correlated with QOL in asthma patients.[11,15,16] This agrees with our results. Moreover, the number of patients whose PEF data were evaluated was small in the present study.

Many QOL instruments dealing with asthma have been developed, including the Asthma Quality of Life Questionnaire (AQLQ)[16-18] and the Living with Asthma Questionnaire (LWAQ).[19] Each instrument has its own unique form and features. Specific QOL scales include questions directly related to asthma, and many of these instruments have been employed in clinical trials. Van der Molen and colleagues[20] reported the discriminative property of two generic questionnaires (the SF-36 and the Psychological and General Well Being index (PGWB)) and two asthma-specific questionnaires (the AQLQ and the LWAQ). In their cross-sectional comparative study involving asthma patients, the SF-36 and AQLQ performed better than the PGWB and LWAQ. On the other hand, they reported that the improvement in the quality of life during a placebo-controlled trial using formoterol was very small and was only reflected by the LWAQ, while no improvement in QOL was seen with the SF-36, the PGWB, and the AQLQ.[21]

In the future, studies comparing generic HRQOL instruments, such as the SF-36, and disease-specific HRQOL instruments, such as the AQLQ and the LWAQ, are needed to determine their validity and responsiveness. It is likely that the usefulness of the AHQ-33 for assessing the HRQOL of asthma patients will be confirmed. Furthermore, we hope that versions of the AHQ-33 will be developed for other countries, and that their use will be studied.

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