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To cite this article: Yulan Qu, Chen Zhang, Wei Gao, Yunye Ning, Ruohua Chen, Shu Zhang, Yahong Sun, Yan Shang & Chong Bai (2017): Validity of a Chinese version of the Mini Asthma Quality of Life Questionnaire (MiniAQLQ) and a comparison of completion by patients and relatives, Journal of Asthma, DOI: [10.1080/02770903.2017.1325491](https://doi.org/10.1080/02770903.2017.1325491)

To link to this article: <http://dx.doi.org/10.1080/02770903.2017.1325491>

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Validity of a Chinese version of the Mini Asthma Quality of Life Questionnaire (MiniAQLQ) and a comparison of completion by patients and relatives

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ABSTRACT

Objective: To test the psychometric properties of the Chinese version of the Mini Asthma Quality of Life Questionnaire (MiniAQLQ) and to investigate the differences between the MiniAQLQ completed by patients (p-MiniAQLQ) and by their relatives (r-MiniAQLQ). **Methods:** One hundred and two asthmatic patients and 45 relatives were recruited. The reliability was evaluated using Cronbach's alpha and intraclass correlation coefficient (ICC). The validity of the MiniAQLQ was assessed by comparing it with the Sydney Asthma Quality of Life Questionnaire (AQLQ-S) and lung function measurements. The mean quality of life scores were compared by gender and smoking history, and the p-MiniAQLQ scores were then compared with the r-MiniAQLQ scores. **Results:** The MiniAQLQ showed high internal consistency (Cronbach's alpha = 0.901) and a high two-week reproducibility (ICC = 0.863). The cross-sectional correlations between the MiniAQLQ and the AQLQ-S were strong. Correlations between the MiniAQLQ and lung function (predicted FEV₁% and PEF) ranged from poor to weak at the total or domain levels. The MiniAQLQ scores were not significantly associated with gender or smoking history. There was poor agreement between the p-MiniAQLQ and r-MiniAQLQ scores at the total or domain levels. **Conclusions:** The Chinese version of the MiniAQLQ showed good reliability and validity. It is reliable for evaluating the impact of asthma on patients' quality of life. Relatives of the patients did not have a comprehensive grasp of the patients' conditions. Physicians should be cautious when patients' relatives come to the hospital to seek a modified treatment when the patients are not present.

ARTICLE HISTORY

Received 6 December 2016
Revised 24 April 2017
Accepted 26 April 2017

KEYWORDS

Doctor–patient relationship;
health-related quality of life;
MiniAQLQ; relatives;
reliability; validation

Introduction

Asthma, characterized by reversible airway obstruction and airway hyper-responsiveness, is a common chronic inflammatory disease throughout the world [1]. Suffering from the symptoms of wheezing, breathlessness, chest tightness and coughing, most patients with asthma will have significant physical, emotional and social limitations, which can impact quality of life [2]. The disease is very common in affluent societies, in which up to 300 million people are affected worldwide, which results in substantial morbidity and annual healthcare expenditure [3]. The total cost of the disease, both in direct medical costs and indirect costs caused by loss of productivity, has resulted in a huge economic burden [4].

Health-related quality of life (HRQoL) is part of the overall quality of life, which is primarily determined

by an individual's health status and influenced by various clinical interventions [5]. HRQoL is patient centred and reflects the individual's perception of his/her health-related functionality and well-being. Furthermore, this type of information may help clinicians make decisions. Evidences show a poor correlation between the results of classic clinical measures and the quality of life of patients with asthma [6–9]. These clinical measures do not provide a complete view of the impact of asthma on a patient's physical, emotional or social well-being. Consequently, HRQoL measures have gained popularity as a clinical outcome both in research and clinical practice over the past decades. For adults with asthma, a variety of HRQoL measures [1,10,11] are in use, including the Juniper Asthma Quality of Life Questionnaire (AQLQ-J) [1] and the Sydney Asthma Quality of Life Questionnaire (AQLQ-S) [11].

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Although the AQLQ-J has been reported to help assess how patients' lives are affected by asthma, it is not easy to put into practice because of the number of items [12]. The Mini Asthma Quality of Life Questionnaire (MiniAQLQ) is a shorter and simpler version that can be used with greater efficiency in large clinical trials and for long-term monitoring [13]. The MiniAQLQ has been reported to have excellent psychometric properties [14–16] and has been widely used in clinical research [17–19]. The MiniAQLQ has also been translated and validated in several languages [20–22]. However, a Chinese version has yet to be developed. The AQLQ-S has been reported to have good psychometric properties and has been translated into Chinese [23–25], so the Chinese version of the AQLQ-S can be used as a reference for evaluating the MiniAQLQ.

In recent years, tensions rising between doctors and patients in China [26,27]. It is not uncommon to see many relatives, instead of the patients themselves, visiting the asthma clinics to seek medical treatment or changes in prescription medications for the patients. As a result, a clinician may easily misdiagnose a condition when he or she does not have a face-to-face interview with the patient, because the patient's relatives may not accurately describe the patient's exact condition. As a consequence, the patient's symptoms may not improve after taking pills or undergoing other treatments, which may lead to a patient's distrust of the doctor and aggravate the relationship between doctors and patients. Therefore, clinicians must determine whether the patients' relatives have a good, comprehensive understanding of the patients' condition compared with the patients themselves.

Therefore, we aimed to translate the original version of MiniAQLQ into Chinese and evaluate the reliability and validity (compare the MiniAQLQ with the Chinese version of the AQLQ-S and lung function) of the Chinese version. We also performed the MiniAQLQ to investigate whether relatives had a comprehensive understanding of the patient's HRQoL.

Methods

Participants

Participants recruited from the respiratory clinic of three separate hospitals were enrolled between February 2016 and October 2016. The first group (group A) consisted of 102 adult patients between 18 and 76 years of age who visited the respiratory clinics for asthma. All patients were clinically diagnosed with asthma, and they all experienced symptoms or received asthma medications. Patients were excluded if they (a) were younger than 18, (b) had fixed airway obstruction (predicted forced expiratory volume

in 1 second (FEV1) after bronchodilation <60%) [28], (c) had another illness that might have an impact on health-related quality of life or (d) had difficulties comprehending or completing the questionnaires. The second group (group B) comprised 45 relatives of patients who accompanied the patients to the clinics. The 45 patients were randomly selected from group A. The inclusion criteria included the following: participants who were immediate family members; participants who were living with the patients; and participants who were familiar with the patients' conditions. Written consent was obtained from all participants. The study was approved by the ethics committee at our hospital.

Translation and cross-cultural adaptation

The translation and cross-cultural adaptation of the original MiniAQLQ followed previous published international guidelines [29,30]. The process was conducted in five steps. *Step I – forward translation*: Two native Chinese speakers (one pulmonary physician who is fluent in English, and one professional translator who is a native Chinese speaker studying in America) independently translated the original version of the MiniAQLQ (English) into Chinese. *Step II – synthesis of the two translations*: The 2 translators and 2 pulmonary physicians with clinical experience in asthma then held a consensus meeting to develop a preliminary version. *Step III – backward translation*: The preliminary version was then back translated into English by two native English speakers who were blinded to the original version. *Step IV – reconciliation*: A second consensus meeting of all stakeholders (the authors, the four translators and one linguist) was held to compare the back translation with the preliminary Chinese version and the original English version and to resolve ambiguities and discrepancies to establish a pre-final Chinese version of the MiniAQLQ. *Step V – test the pre-final version*: The pre-final MiniAQLQ was tested in 15 outpatients with symptomatic asthma. The patients were asked to confirm whether they had difficulty in comprehending all the items. The expert committee then modified the pre-final version based on the findings from the pre-test. The final Chinese version of the MiniAQLQ (Supplementary Material) was produced.

Study design

We conducted a cross-sectional study in an outpatient room of the department for the assessment of asthma. All participants were interviewed face-to-face. Data were collected by a trained interviewer. We conducted a cross-sectional study of group A. At each visit, a detailed history was obtained from all the patients. The history included:

demographics, smoking history (current smoker, ex-smoker or non-smoker), number of hospitalizations in the past two weeks, asthma history (development and duration of the disease, symptoms and severity, aggravating factors, current medications and related comorbid conditions) and a physical examination. Current smoker is someone who has smoked cigarettes regularly and has smoked in the last two weeks. Individuals who had ever smoked (but did not smoke in the last two weeks) would be defined as ex-smokers. Then, the patients were asked to complete the MiniAQLQ and the Chinese version of the AQLQ-S. The time to complete the MiniAQLQ was also recorded. Spirometry tests were performed at the pulmonary function room of our hospital. The ATS/ERS standards were followed to ensure result accuracy. The repeatability of the MiniAQLQ was assessed over a two-week interval in a random sub-sample of 56 clinically stable patients. None of these patients had changes in their asthma condition or treatments during the interval. The patients were not shown their initial responses when they completed the second questionnaire. Forty-five patients and their relatives were asked to complete the MiniAQLQ to evaluate whether the relatives had a good knowledge of the patients' HRQoL. When completing the questionnaire, relatives were not allowed to ask the patients for help. They could only rely on their own impressions of the patients' conditions.

Instruments

The MiniAQLQ is a disease-specific quality of life questionnaire composed of 15 items [13]. The MiniAQLQ has four domains: environmental stimuli (three items), symptoms (five items), emotional function (three items) and activity limitation (four items). A seven-point Likert scale was used, and each item was rated on an ordinal scale of 1–7, with lower scores reflecting more a severe impairment in quality of life. The score for each domain separately emerged from the average of all the items that were included in the domain. A global score was calculated by averaging the scores for the four domains. The questionnaire measured quality of life over the 2 weeks prior to the study.

The AQLQ-S [11] is a 20-item questionnaire composed of four dimensions (breathlessness, mood disturbance, social disruption and health concerns). Patients were asked to recall their experiences during the previous four weeks and to score each of the 20 questions on a 5-point scale from 0 = not at all to 4 = very severely. Higher scores represented a worse quality of life. Each subscale score or total score was converted to a 0 to 10 scale by multiplying the result by 2.5 and then dividing by 10 [31].

Statistical analysis

Demographic data for the patients with asthma in group A were presented as means with standard deviations (SD) or as medians with ranges. The reliability of the MiniAQLQ was evaluated by determining its internal consistency using Cronbach's alpha coefficient (α). A value greater than 0.70 was considered acceptable [32]. Test-retest reproducibility was assessed by calculating the intraclass correlation coefficient (ICC). The ratio of the within-subject variance to the total variance was expressed as an ICC. An ICC value greater than 0.60 indicates good reliability, and an ICC >0.80 reflects excellent reproducibility [33]. Cross-sectional validity was assessed by comparing the MiniAQLQ scores with the AQLQ-S scores, peak expiratory flow (PEF) and predicted FEV1% using Spearman's correlation coefficients (r). The correlations were judged as absent ($r < 0.20$), poor ($r = 0.20$ – 0.30), weak (0.31 – 0.50), moderate (0.51 – 0.70), good (0.71 – 0.90) and excellent (0.91 – 1.0) [34]. We hypothesized that the MiniAQLQ would correlate strongly with the AQLQ-S and poorly with the predicted FEV1% and PEF. A Wilcoxon rank sum two-sample test was used to compare the scores between patient categories (gender, smoking history, etc.). Paired-sample t -tests and ICCs were calculated to compare the differences between the scores of the MiniAQLQ completed by the patients (p-MiniAQLQ) and their relatives (r-MiniAQLQ). Statistical analyses were performed using SPSS version 21.0 (SPSS, Chicago, IL, USA). $p < 0.05$ was considered significant.

Results

Patients' characteristics and data distribution

Table 1 shows the characteristics of the study population. One hundred and two adult asthmatic subjects, including 63 (62%) women, whose ages ranged between 18 and 76 years (mean [SD] 49.4 [15.5] years) were studied. The

Table 1. Characteristics of the patients ($N = 102$).

Variables	Total sample
Age (years) ^a	49.4 ± 15.5
Gender (%)	
Female (%)	63 (62)
Male (%)	39 (38)
Duration of asthma (years) ^a	17.1 ± 12.6
Current or ex-smoker (%)	27 (26)
Current asthma medications	
No medications	6
Short-acting β_2 -agonist alone	28
Short-acting β_2 -agonist + inhaled steroid	57
Short- and long-acting β_2 -agonist + inhaled steroid	11
Predicted FEV1 (%) ^a	77.2 ± 19.4

^aValues are mean ± standard deviation.

FEV1: forced expiratory volume in 1 second.

Table 2. Distribution, internal consistency and test–retest reliability of the MiniAQLQ.

Domains	Mean $\pm$ SD	Cronbach's alpha ^a	ICC ^b (CI range)
Overall	5.25 $\pm$ 0.95	0.901	0.863 (0.766–0.919)
Symptoms	5.22 $\pm$ 1.12	0.803	0.849 (0.742–0.911)
Environmental stimuli	5.17 $\pm$ 1.21	0.717	0.815 (0.685–0.892)
Emotional function	4.65 $\pm$ 1.15	0.543	0.755 (0.583–0.857)
Activity limitation	5.82 $\pm$ 1.18	0.884	0.853 (0.749–0.914)

ICC: intraclass correlation coefficient; CI: confidence interval.

^aCronbach's alpha greater than 0.70 was considered acceptable.^bGood reproducibility (ICC > 0.60).

mean duration of asthma was 17 years, and the mean pre-bronchodilator predicted FEV1% was 77.2%. Twenty-three per cent of the patients were current smokers. The majority of the patients were using a short-acting β 2-agonist (94.1%) and an inhaled steroid (66.7%). Approximately 1.9% of all patients reported a hospital admission in the previous two weeks. The average time required to complete the MiniAQLQ was 3.9 minutes.

The distribution of the total and domain scores of the MiniAQLQ is displayed in Table 2. The mean (SD) scores were: total score 5.25 (0.95), 'symptoms' 5.22 (1.12), 'environmental stimuli' 5.17 (1.21), 'emotional function' 4.65 (1.15) and 'activity limitation' 5.82 (1.18).

Reliability

The MiniAQLQ was shown to have good reliability (Table 2). Cronbach's alpha was 0.901 for the total MiniAQLQ score. For the domains of the MiniAQLQ, all Cronbach's alpha values were greater than 0.7, with the exception of the emotional function domain. There was good test–retest reliability, with an ICC of 0.863 for the total score and 0.755–0.853 for the individual domains.

Cross-sectional construct validity

Correlation between the MiniAQLQ and the AQLQ-S

A correlation matrix of the two questionnaires is shown in Table 3. Strong correlations were observed between the total scores of the MiniAQLQ and the AQLQ-S ($r = -0.844$, $p < 0.0001$). The domain scores of the MiniAQLQ and the AQLQ-S showed weaker, but still moderate ($0.5 < r < 0.8$) correlations. The only exception was the 'breathlessness' domain of the AQLQ-S, which was moderately correlated ($r < 0.5$) with the 'emotional function' domain of the MiniAQLQ.

Correlation between the MiniAQLQ and lung function tests

There was no significant correlation between the MiniAQLQ total score or any domain score with the predicted FEV1%. Correlations between the total or domain

Table 3. Relationship of domain and total scores of the MiniAQLQ and AQLQ-S.

	MiniAQLQ				
	Symptoms	Environmental stimuli	Emotional function	Activity limitation	Overall
AQLQ-S					
Breathlessness	– 0.705	– 0.611	– 0.491	– 0.756	– 0.770
Mood	– 0.715	– 0.612	– 0.548	– 0.678	– 0.754
Social	– 0.668	– 0.588	– 0.565	– 0.778	– 0.781
Concerns	– 0.595	– 0.575	– 0.625	– 0.569	– 0.712
Overall	– 0.754	– 0.660	– 0.610	– 0.610	– 0.844

Spearman's rank correlation coefficients, all correlation coefficients showed p values < 0.0001.

The correlations between the MiniAQLQ and AQLQ-S scores are negative because the respective scores run in the opposite directions.

Good correlations (bold; $r = 0.71$ – 0.90), moderate correlations ($r = 0.51$ – 0.70), weak correlations (italic/underlined; $r = 0.31$ – 0.50).

Table 4. Correlations^a between spirometry parameters with domain and total scores of the MiniAQLQ.

	MiniAQLQ				
	Symptoms	Environmental stimuli	Emotional function	Activity limitation	Overall
PEF	0.08	0.20	0.21	0.22	0.20
FEV1, % pred	0.05	0.08	0.11	0.13	0.10

^aSpearman's rank correlation coefficients.

FEV1: forced expiratory volume in 1 second; PEF: peak expiratory flow.

scores for the MiniAQLQ with PEF were absent or poor (Table 4).

Relationship between the MiniAQLQ and the patients' characteristics

As shown in Table 5, there was no significant difference in the total MiniAQLQ scores between men and women, but men received a significantly better score for the 'emotional function' domain. No significant differences in the total and domain scores on the MiniAQLQ were observed between current non-smokers (non-smokers and ex-smokers) and smokers.

Table 5. Mean score of the MiniAQLQ according to patient characteristics.

	MiniAQLQ				
	Symptoms	Environmental stimuli	Emotional function	Activity limitation	Overall
Gender					
Female (N = 63)	5.25	5.01	4.27	5.89	5.18
Male (N = 39)	5.58	5.41	5.15	5.93	5.55
p Value ^a	0.203	0.136	0.001	0.426	0.064
Smoker					
Yes (N = 27)	5.72	5.57	5.20	6.25	5.73
No (N = 75)	5.31	5.09	4.54	5.80	5.24
p Value ^a	0.084	0.151	0.053	0.144	0.079

^aWilcoxon rank sum two-sample test.

Table 6. Comparison between the p-MiniAQLQ and r-MiniAQLQ ($N = 45$).

Domains	p-MiniAQLQ (mean $\pm$ SD)	r-MiniAQLQ (mean $\pm$ SD)	Difference	Paired t-test (p -Value)	ICC
Overall	5.36 $\pm$ 0.90	5.24 $\pm$ 0.76	0.12	0.460	0.483
Symptoms	5.36 $\pm$ 1.03	5.29 $\pm$ 0.76	0.07	0.707	0.256
Environmental stimuli	5.32 $\pm$ 1.15	4.74 $\pm$ 1.36	0.58	0.039	0.164
Emotional function	4.34 $\pm$ 1.38	4.75 $\pm$ 0.94	0.41	0.101	0.286
Activity limitation	6.14 $\pm$ 0.91	5.92 $\pm$ 1.12	0.22	0.291	0.369

p-MiniAQLQ: MiniAQLQ completed by patients; r-MiniAQLQ: MiniAQLQ completed by relatives.

Comparison between the p-MiniAQLQ and r-MiniAQLQ

There was poor agreement between the total scores for the p-MiniAQLQ and r-MiniAQLQ ($ICC = 0.483$). ICCs for the 'symptom', 'environmental stimuli', 'emotional function' and 'activity limitation' domains were 0.256, 0.164, 0.286 and 0.369, respectively. A significant difference (Δ) in the scores ($\Delta = 0.58$; $p = 0.039$) was noted in the 'environmental stimuli' domain (Table 6).

Discussion

In the present study, we translated the MiniAQLQ into Chinese and tested the reliability and construct validity of the Chinese version. We confirmed that the Chinese version of the MiniAQLQ was reliable and valid for the evaluation of HRQoL in asthma patients. However, the patients' relatives did not have a comprehensive grasp of the patients' conditions.

We observed excellent internal consistency ($\alpha > 0.7$) for the MiniAQLQ at the total and domain level, except for the 'emotional function' domain. The results agreed with the outcomes of other studies that employed the MiniAQLQ [13,20,21]. ICCs for both the total score (0.863) and the domain scores (0.755–0.853) indicated good reproducibility and were equivalent to the results of other studies [13,20].

The MiniAQLQ and the AQLQ-S correlated well at the total score level. This correlation was also observed in most of the domain-domain correlations. Similar strong correlations were observed in the study by Christian and colleagues [14], which showed that the MiniAQLQ measures the same construct as the AQLQ-S. The correlations between the MiniAQLQ scores and the spirometry parameters were poor or absent, similar to the results for the English version [8,14], the Indian version [7] and the German version [9]. Both types of parameters evaluate different constructs. This outcome was consistent with the hypothesis that HRQoL is a different but important dimension of the impact of asthma that should be evaluated separately in addition to routine clinical tests.

We also assessed the mean MiniAQLQ scores of patients by gender and smoking history. After comparing the MiniAQLQ scores obtained from smokers

and non-smokers, we did not identify a significant difference in any of the domains. Juniper and colleagues reported that women had a better HRQoL, which did not agree with our results [1]. The only significantly different score in the female group was the score for the 'emotional function' domain. Women were previously reported to experience a greater impact of asthma on their emotions and feelings [11], suggesting that women express greater anxiety and depression regarding their illness.

The poor agreement between the p-MiniAQLQ and r-MiniAQLQ suggested that relatives are not sufficient surrogates and advocates for the patients. Relatives did not have a comprehensive grasp of the patients' conditions, particularly the patients' emotional and psychological state of mind.

However, there are some limitations that should be acknowledged. First, the sample did not represent the entire Chinese population with asthma. Second, we did not evaluate the responsiveness of the MiniAQLQ. Therefore, the MiniAQLQ does not completely reflect the improvement in patients who have received treatments. Furthermore, a longitudinal study of construct validity in patients with asthma is required to confirm our findings.

Conclusions

The original version of the MiniAQLQ has been translated into a Chinese version and has good psychometric properties. HRQoL and spirometry parameters are both important outcomes that must be evaluated in asthma patients. The Chinese version of the MiniAQLQ may be used by physicians to evaluate the impact of asthma and its treatment on patients' HRQoL. Relatives of the patients did not have a comprehensive grasp of the patients' conditions. Therefore, physicians should exercise caution when relatives visit the hospital to seek modified treatments or prescriptions for the patient.

Acknowledgments

The authors wish to thank all the patients participating in the study. This project was funded by the National Natural Science Foundation of China (81270073, 81273319,

81570019, 81570020) and Shanghai Pujiang Talent program (14PJ1411000).

Declaration of interest

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of the paper.

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