Applicability of Hyland’s Living with Asthma Questionnaire for Japanese Asthmatic Patients

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Abstract

Objective To assess the applicability of Hyland’s Living with Asthma Questionnaire (LWAQ, 1991), one of the international health-related quality of life scales, for Japanese asthmatic patients with reference to its reproducibility and validity.

Subjects and Methods The LWAQ was given to randomly selected asthmatic patients on two occasions separated by a 12-week interval.

Results The mean scale score in the first study (n=304) was 1.83 (range, 1.14-2.77) and logarithmic values of the scores approached normal distribution. The scale scores in the first and second (n=158) studies were well correlated (r=0.81), however, the mean score decreased (0.08) significantly. The questions were further separated into 11 domains. The sex-domain was notable for a low response rate (68%), and scale scores in the sleep-, colds- and sex-domains in the first study varied considerably from those of the other domains. Frequency distributions of scores in the five constructs (Hyland 1996) were not normal and, with the exception of the colds construct, the relations among the remaining four constructs were similar to those previously reported (Hyland 1996).

Conclusion Analysis using the mean scale score, domain and construct in the LWAQ is applicable to Japanese asthmatic patients. (Internal Medicine 39: 798–803, 2000)

Key words: quality of life, bronchial asthma, reproducibility

Introduction

Efficacy of treatment in chronic diseases has ordinarily been assessed using laboratory data and clinical examination. On the other hand, measurement of health-related quality of life (HQOL) has increasingly been used to assess main outcome variables in clinical studies (1). With regard to bronchial asthma, there are international scales for HQOL assessments such as asthma quality of life questionnaire (AQLQ) (2), living with asthma questionnaire (LWAQ) (3) and others (4, 5). Several HQOL scales to assess Japanese asthmatic patients in particular have also been developed (6, 7) because HQOL may be closely related to the life-style in individual countries. However, many of the Japanese scales use content which has not been rigorously tested and may thus be unsatisfactory. We therefore attempted to apply international HQOL scales to Japanese patients. Among the international HQOL scales, LWAQ is particularly advantageous since, being self-administered, HQOL can be assessed even in those who hesitate to be interviewed. LWAQ had been previously applied to Japanese asthmatic patients in two studies (8, 9) and the specificity and sensitivity were evaluated. However, subject numbers were small and reproducibility of scale scores, as well as validity of domain (3) and constructs analysis (10) were not addressed. In the present study, we examined applicability of LWAQ for a large number of Japanese asthmatic patients with regard to these variables.

Subjects and Methods

In December 1998, asthmatic patients, who regularly visited Tokai University Hospital or Tokai University Oiso Hospital, were randomly selected as potential subjects. The patients who consented to the study filled out LWAQ (the first study) and returned it by mail. After 12 weeks, all the patients were again asked to fill out the LWAQ (the second study). The data in the first study were analyzed for frequency distribution of the scores in scale, domain and construct. The data from the patients who participated in both the first and second studies were analyzed for reproducibility. In January 1999, a breath-actuated inhaled steroid, Fluticasone Diskhaler, was introduced in our hospitals. Those who were treated with this new drug were eliminated from the reproducibility study because of concern that the inhaled steroid might have a significant influence on the HQOL (8, 11, 12). Pharmacologic therapy in the remaining patients was unaltered.

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We translated all questions in the LWAQ into Japanese. These translations were similar to those used in another study to assess Japanese asthmatic patients (9). Each item in the LWAQ allowed for four choices which were “very true of me”, “slightly true of me”, “untrue of me”, and “not applicable”. If the answer was “not applicable” or was not completed the item was excluded from the analysis. In their original article Hyland et al (3) rated each question as 1, 2 or 3 with calculated scale scores between 1.00 and 3.00 (higher scores reflecting poorer QOL). If the answers were “not applicable” or not completed in more than 23 items, the response was excluded from the study.

The questions comprising the LWAQ include 43 negative and 25 positive items, covering 11 domains. As originally described, the composition of each domain was not detailed and it was unclear whether some items were considered positive or negative for calculating scale scores. Following communication with the author we eliminated item #55 from the analysis because it did not permit appropriate classification. The items and domains are listed in Table 1.

Wilcoxon’s non-parametric test was used for statistical analysis of data. A p value of less than 0.05 was considered significant. We further analyzed five constructs (10, 13) calculated from the responses to the questions: colds, avoidance, distress, preoccupation, and activities. As in Hyland’s study (10) the constructs were analyzed with a factor analysis.

### Results

In the first and second studies, 320 and 295 completed questionnaires were returned to us, respectively (return rate 94% in each study). Twenty-eight patients who participated in the first study did not respond in the second study. Three patients failed to identify themselves in the first study and were not able to proceed to the second study. One patient died between the two studies. Seven patients were newly recruited in the second study.

Three hundred four responses satisfied the criteria in the first study. The mean age was 51.7±15.9 years and the male to female ratio was 0.71. Based on their prescriptions approximately 70% of the patients were categorized as having bronchial asthma of moderate severity (unpublished data). Two hundred eighty-eight responses satisfied the criteria in the second study. The number of patients participating in the two studies was decreased by 0.08. This change was statistically significant whether comparing mean scale scores or logarithmic mean scores. The scale scores in the first and second studies were well correlated (r=0.81).

#### Domain analysis

The response rates and number of accepted answers on each domain were higher than 95% except for the “sex” domain (68%). Figure 2 shows the box plots of the scores in each domain in the first study. As shown, the distribution and the median of scores varied depending on the domain. The horizontal line in Fig. 2 represents the mean scale score (i.e., mean of the 67 items). Except for “effects on others” and “dysphoric states and attitudes”, the mean scale score was significantly different from the median of the individual domains (analyzed with paired sign test). In particular, the mean scale score was not correlated with the interquartile range in “social” and “colds” domains.

Figure 3 shows the change of scores in each domain between the first and second studies. The five solid circles represent the domains with significant change. Scores in the remaining six domains (clear circles) showed no significant changes. The domains significantly changed were “social”, “effect to female” and “sleep.”
Construct analysis

We calculated scores for five constructs from these 67 items according to Hyland (10, 12). Frequency distributions of scores in each construct are shown in Fig. 4. As noted, these distributions were not normal. Since the “colds” construct consists of only 3 items the scores should not be assumed to be continuous values. The distribution of logarithmic values in the remaining four constructs, avoidance, distress, preoccupation, and activities, were closer to normal (skewness, −0.10, 0.09, −0.35 and 0.02; kurtosis, −0.56, −0.58, −0.14, and −0.54). Score of the “colds” construct was distributed to the higher score range and the logarithmic values did not distribute as normal (skewness, −1.05; kurtosis, 0.86).

In factor analysis of the first study, the loading of the first unrotated factor was always much higher than the others confirming that most of the items load on the first factor in the five constructs (10). Table 2 shows the factor correlation matrix of the four constructs obtained from oblique solutions. The “colds” construct is eliminated from the matrix. As reported in Hyland’s study (10), excluding the “colds” construct, no positive correlation was found in any of the relations.
Hyland's LWAQ for Japanese Asthmatics

Figure 4. Frequency distribution of construct scores in the first study. The distribution of the colds construct cannot be regarded as continuous.

Table 2. Factor Correlation Matrix of the First Study

<table>
<thead>
<tr>
<th></th>
<th>Avoidance</th>
<th>Distress</th>
<th>Preoccupation</th>
<th>Activities</th>
</tr>
</thead>
<tbody>
<tr>
<td>Avoidance</td>
<td>1.000</td>
<td>0.260</td>
<td>0.330</td>
<td>0.336</td>
</tr>
<tr>
<td>Distress</td>
<td>1.000</td>
<td>0.260</td>
<td>0.340</td>
<td></td>
</tr>
<tr>
<td>Preoccupation</td>
<td>1.000</td>
<td>0.208</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Activities</td>
<td>1.000</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 5 shows changes in the scores of each domain between the first and second studies. In the construct scores, colds was slightly but significantly decreased in the second study.

Discussion

In two previous studies LWAQ was applied to small numbers of Japanese asthmatic patients. One (9) report stated good correlation between HQOL scores and either comprehensive asthma inventory (CAI) scores or the Egogram check list (ECL) in 50 mild asthmatic patients. However, there was no significant correlation between HQOL score and lung function test results. Another (8) reported significant improvement of pulmonary function (FEV₁) and significant decrease in HQOL scores after inhaled steroid therapy for 3 or 6 months but correlation between them was poor. These results were similar to those in British (3), American (11) and Australian studies (10), suggesting that validity and responsiveness of LWAQ are simi-
lar in Japanese asthmatic patients to those of English speaking countries. However, reproducibility of HQOL score and analysis with domain or constructs have not been investigated in Japanese asthmatic patients. The mean scale score in the present study was higher than those previously reported in Japan (8, 9). We believe our scale scores are reliable because our study was based on much larger sample numbers and our scores were comparable to previous scores in English-speaking countries (1, 3, 11).

We confirmed that our translation to Japanese was similar to that of Mashima, although we cannot comment on Nishimura's translation because it was not available. However, slight differences in expression may affect the scale scores. Therefore, a standardized Japanese edition of the HQOL questionnaire is needed.

In most prior studies (1, 3, 11, 12), results of the LWAQ have been expressed as the mean and standard deviation. This would suggest that the scale scores are normally distributed. However, in the present study, a distribution approximating normal was found only in the logarithmic values and not in the raw scale scores. That frequency distribution of scale scores was not normally distributed was also recognized in the report by Molen et al (1). We suggest that comparison of distributions should be done in logarithmic values.

In our analysis there was a good correlation between the scale scores in the first and second studies. However, the logarithmic mean scale score improved slightly but significantly in the second study. In previous studies, HQOL increased slightly by 0.09 (11) or remained unchanged (1). Therefore the change in scale scores in this study was within the reported range of variation. Several factors may have accounted for the change in scale scores. They may have included seasonal changes in asthmatic signs and symptoms, the effect of the HQOL on the perception of patient’s confidence in their medical care, and the epidemic of influenza A in the winter of 1998. Our results suggest that the scale score might be changed in the three months without medical intervention so that a control group is essential when using LWAQ.

Of the 11 domains, the response rate to the “sex” domain was the lowest and consequently analysis of this domain would appear to be less reliable. This area of inquiry may be inappropriate for Japanese patients since Japanese are generally reticent to discuss their sexual behavior. The age range of the patients (mean 51.7 years) may also have impacted the rate of satisfactory responses. We found that the median of each domain score did not coincide with mean scale score as in the study by Hyland (10) and that the difference was small in both our studies. Furthermore, the mean scale score fell outside of the interquartile range of the “sleep” and “colds” domains. Therefore caution is necessary in evaluating these domains of LWAQ in Japanese asthmatic patients.

Hyland et al (10) reported that constructs analysis yielded better resolution of HQOL assessments. In their study only the “colds” construct was negatively correlated with the others. Our score distribution analysis revealed that the “colds” construct did not distribute normally even in logarithmic values. This finding suggests that the basis of construct analysis (i.e. factorial analysis), is not applicable. However, when the colds construct was eliminated from the analysis, the relations among the four constructs in the present study were similar to those reported by Hyland et al (10). Figure 5 again suggests the necessity of control groups in the construct study.

As previously noted, some HQOL questionnaires have been specifically developed for Japanese asthmatic patients. We previously investigated several items that were not included in the LWAQ but that may be specific to the life-style of Japanese asthmatic patients (14). Our investigation revealed that such items as a pet, a tour, the financial burden of medical care and so on were correlated with mean scale scores and suggest therefore that sensitivity and validity of the LWAQ could be improved by adding several questions for Japanese asthmatic patients.

In conclusion, our study affirmed that LWAQ has acceptable reproducibility and validity in analysis with mean scale score, domain scores and construct score in Japanese asthmatic patients. We conclude that LWAQ is applicable to studies of Japanese asthmatic patients with the caution that scores of sex, sleep, and colds are less valid in domain analysis and that the colds score is also less valid in construct analysis.

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References

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