Validity and reliability of "asthma quality of life questionnaire" in a sample of Turkish adult asthmatic patients

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ÖZET

"Asthma quality of life questionnaire" yaşam kalitesi anketinin erişkin astımlı Türk hasta örneğinde geçerliliği ve güvenilirliği

Çalışmamızda Astım yaşam kalitesi anketi [Asthma Quality of Life Questionnaire (AQLQ)]'nin Türkçe sürümünün erişkin astımlı Türk hastalarda geçerliliği ve güvenilirliğinin araştırılması amaçlanmıştır. Astım için küresel girişim [Global Initiative for Asthma (GINA)] 2008 kriterlerine göre daha önceden veya yeni tanı almış 18-55 yaş arası stabil dönemde, semptomatik, ardışık 118 astım hastası çalışmaya alındı. Hastaların astım ağırlığı belirlendi ve AQLQ anketinin Türkçe adaptasyonu uygulandı. Aynı zamanda Lara astım semptom skorları (LASS), solunum fonksiyon testleri, "Medical Outcomes Survey Short Form-36 (SF-36)" Türkçe adaptasyonu değerlendirildi. Tüm uygulamalar başlangıçta ve 10. haftada yapıldı. Bu süreç içinde hastalar tedavilerini gereğinde değiştirmekte serbest bırakıldılar. Çalışmaya alınan 118 hastanın 95'i kadındı, 14 hasta takipte değerlendirilemedi. Hastaların %62'si hafif, %38'si orta-ağır astım grubundaydı. AQLQ iç uyumluluğu yüksekti (Cronbach's alpha 0.81-0.87) ve soru-toplam skor korelasyonları 0.75-0.89 arasında değişmekteydi. AQLQ alan ve toplam skorları ile SF-36 alan skorları arasındaki kesitsel ve izlemsel ilişki az veya orta derece arasında değişmekteydi (r= 0.241-0.626, p< 0.005). AQLQ değerleri astım ağırlığı ve LASS'ye göre birinci (p< 0.001, her ikisi için) ve 10. hafta vizitlerinde (p= 0.006, p< 0.001 sırasıyla) anlamlı derecede farklılık göstermekteydi. İzlemde LASS'nin anlamlı değişiklik göstermesine paralel olarak, AQLQ'nun semptom domaininde anlamlı değişiklik olduğu saptandı (p< 0.001). Sonuçlarımız AQLQ'nun Türkçe sürümünün erişkin astımlı Türk hastalarda uygulanabilir, geçerli ve güvenilir olduğunu ortaya koymuştur.

Anahtar Kelimeler: Astım, yaşam kalitesi, geçerlilik, güvenilirlik.

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SUMMARY

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We aimed to investigate the validity and reliability and of "Asthma Quality of Life Questionnaire (AQLQ)" in Turkish adult asthmatic patients. New or previously diagnosed [according to Global Initative for Asthma (GINA) 2008] symptomatic 118 consecutive stable asthmatic patients between 18 and 55 years old were included. Asthma severity was determined and Turkish adaptation of the AQLQ was administered. Lara asthma symptom scales (LASS), pulmonary function tests, Turkish adaptation of Medical Outcomes Survey Short Form-36 (SF-36) were evaluated. All assessments were done twice at recruitment and after 10 weeks. During this period patients were allowed to make modifications on their medication when necessary. Among the recruited 118 patients 95 were female and 14 were lost in the follow-up. Sixty-two percentages of the patients had mild and 38% moderate asthma. The internal consistency of AQLQ was high (Cronbach's alpha 0.81-0.87) and item-total score correlations were ranging from 0.75-0.89. The cross-sectional and longitudinal correlations between AQLQ total and domain scores and SF36 domain scores were in a range of little or fair degree (r= 0.241-0.626, p< 0.005). Total AQLQ scores were observed significantly different according to disease severity and LASS both in the first (p< 0.001, both) and 10 weeks follow-up visits (p= 0.006, p< 0.001 respectively). A statistical significant change was observed in AQLQ symptom score as in total LASS changed (p< 0.001, both) in the follow-up. Our results demonstrated that Turkish version of AQLQ is feasible, reliable, valid and sensitive to changes in adult asthmatics.

Key Words: Asthma, quality of life, validity, reliability.

Quality of life is a concept associated with different aspects of human life. Health-Related Quality of Life (HRQOL) focuses on individuals' health status and impacts of the administered treatments. Measuring HRQOL in clinical investigations for assessing disease severity as well as evaluating the efficiency of the therapies in patients with chronic lung disease has become a popular trend in the recent years (1,2). Clinical evaluation determines a patient's health status in terms of objective methods, however a favorable assessment of health status should also include patient's own perception of his condition (3). Asthma is a chronic respiratory disease with significant impacts on physical, emotional, and social life (4). Therefore, besides physiological and clinical evaluations, assessment of health related impairment of quality of life has been an important issue as an outcome measure of asthma (5).

Most commonly used quality of life instruments specific for asthma in adults are the "Asthma Quality of Life Questionnaire (AQLQ)" "Living with Asthma Questionnaire" and "Chronic Obstructive Pulmonary Disease and Asthma St. George's Respiratory Questionnaire" (6-8). The AQLQ was developed by Juniper et al. and designed to be used in clinical trials (6). It has been shown to be reliable (ability to measure differences between patients) and valid (correlation with other indices of quality of life) in asthmatic patients (9). Usually, quality of life questionnaires are generated in English and translated to other languages (10). Reliability and validity of HRQOL questionnaires should be evaluated in each country before using these instruments in multicentric international studies although they are proven to be so in their original forms (11). Therefore we conducted a study in our community to determine the reliability, cross-sectional and longitudinal validity, internal consistency and responsiveness of the Turkish version of the AQLQ in the assessment of disease's impact on physical and, mental state of the asthmatic patients.

MATERIALS and METHODS

Asthma Quality of Life Questionnaire

Juniper AQLQ is a disease specific quality of life questionnaire including 32 items, in four health domains as activity limitation (11 items) (item nos. 1, 2, 3, 4, 5, 11, 19, 25, 28, 31, 32), symptoms (12 items) (item nos. 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 29, 30), emotional function (5 items) (item nos. 7, 13, 15, 21, 27) and environmental stimuli (4 items) (item nos. 9, 17,

23, 26). This instrument measures quality of life over the two weeks prior to the interview.

Scoring of the AQLQ

Each item within the AQLQ is equally weighted. The patients select from an ordinal scale of 7 point,-Likert type answer for every item. The domain scores are computed as the means of domain-specific items and global AQLQ score is computed as the mean of the domain scores. The score of each domain and the global score range from 1 to 7, corresponding to no impairment and maximum impairment, respectively, in quality of life. The minimum clinically important difference for AQLQ has been reported as 0.52 (12).

Turkish Adaptation Process

The original English version of the AQLQ has already been adapted to Turkish by four independent Turkish bilingual senior translators (CS, SE, EE, HF). Translation has been made in colloboration with MAPI Research Institute. In this study, this Turkish version of AQLQ has been used.

Patients

Between January and July 2010, a total number of 118 asthmatic patients who admitted to our respiratory outpatient department were included in the study consecutively They had clinically documented asthma and reversible airflow limitation was demonstrated with an improvement equal to or greater than 15% and 200 mL of forced expiratory volume in 1 second (FEV_1) after inhalation of 200 µg of salbutamol or with a positive methacholine test. Patients in the stable state with medication and aged between 18 and 55 years were included. Patients with other forms of airway obstruction or known acute or chronic comorbidities interfering with physical and psychological performance were excluded.

Study Design

Asthma symptom scores defined by Lara et al. were asked (13). The AQLQ, pulmonary function tests and Medical Outcomes Survey Short Form 36 (SF-36) were performed, thus a cross sectional evaluation was possible (13). After a 10 weeks period patients were asked to complete the AQLQ, SF-36 and asthma symptom scores again and pulmonary function tests were repeated. During this period, patients were allowed to make alterations on their medication when necessary.

All questionnaire data were collected by authors during face-to-face interviews. The method of filling out the questionnaire was explained and patients provided written informed consent. The study was approved by the human-research review board.

Measurement Scales

Lara asthma symptom scale (LASS) include 8 items including cough, wheezing, shortness of breath, chest pain, night symptoms, perceived asthma severity and attacks in the last four weeks. These items were categorized into a Likert-like 5-point scale as (never, a few days, some days, most days, everyday) with the exception of total number of attacks. Attack numbers are recorded and further categorized as; 1= no attacks in the last month, 5 ≥ 3 attacks a month, thus attacks are evaluated by two items. The LASS has been reported to have good internal consistency, excellent validity based in a heterogeneous sample of adults with persistent asthma (14).

SF-36 is a generic HRQOL questionnaire whose validation has been done in Turkish population (15). It is composed from 36 items in 8 domains as physical functioning, role physical, bodily pain, general health, vitality, social functioning, role emotional, mental health. The score from the subscales for this questionnaire range from 0 to 100, with 0 representing no deterioration in the quality of life. Total score of the questionnaire is not calculated; however two summary scores for physical and mental components can be determined from the domain scores. In general population the component summary scores are standardized to have a mean value of 50 with a standard deviation of 10.

Pulmonary function tests were performed with Jaeger Master Screen Pneumo V452I device by a single technician. The best test among the consecutive three tests was accepted. FEV_1, forced vital capacity (FVC), FEV_1/FVC were measured according to American Thoracic Society criteria (16).

Analysis

Characteristics of the asthma patients were presented as median with range, or as mean with standard deviation according to the distribution of the parameters. In the analysis of statistical significance of selected characteristics of patients according to the AQLQ scores t-test, chi-square test, and Mann-Whitney U test were used where necessary.

Reliability analysis: Internal consistency and item-total score correlations were used for reliability analysis. Internal consistency was determined by Cronbach's alpha coefficient. Cronbach's alpha is recommended to be over 0.7 (17). The item and total score relationship was tested by Spearman correlation analysis.

Validity analysis: Validity of the Turkish version of the AQLQ was tested by using two different methods as Convergent Validity and Known Groups Method. Convergent validity refers that two instruments which evaluate same conditions will yield similar results or correlate highly. To assess convergent validity we used correlation (Spearman rank correlation coefficients) analysis for AQLQ and SF-36 domains. Known Groups Method is the ability of discriminating individuals with a known difference from others. It was tested by Student's t test and Mann-Whitney U test for LASS and pulmonary functions where appropriate.

The data were analyzed by SPSS 10.0 statistical package.

RESULTS

This study included 118 asthmatic patients aged between 18 and 55 years (mean age: 40.5 ± 10.2 years), 95 (79%) of whom were female. Thirty-eight percent of the patients had formal education of 5 years or less. Mild asthma was diagnosed in 73 (62%) of the patients while there was moderate-severe asthma in 45 (38%) according to GINA classification. The distribution of basal and follow-up asthma symptom scores, $FEV_1\%$ predicted and AQLQ domains and total scores are shown in Table 1.

Reliability Analysis

Cronbach-α scores for activity (0.87), symptom (0.87), emotion (0.83) and environment (0.81) domains were found to be highly reliable (Table 2). Item versus domain correlations were determined to be high (0.44-0.83) and statistically significant. Item versus total score correlation coefficients ranged from 0.85 to 0.86 for activity domain; 0.85-0.89 for symptom domain and 0.77 to 0.87 for emotion domain and 0.75-0.77 for environment domain (Table 3).

Validity Analysis

Convergent validity: At the basal evaluation, AQLQ activity domain, total score and SF-36 domain score correlations were in a range of fair degree (r= 0.315-0.626, p< 0.005). We found a little or fair correlation in other domains of AQLQ and SF36 (r= 0.241-0.542, p< 0.005) (Table 4). In the follow-up a similar relation was observed between AQLQ and SF-36 domain scores (r= 0.310-0.608, p< 0.005).

Known groups method: The AQLQ total and domain scores were found significantly different among asthma severity stages and symptom score levels determined by LASS in the first and follow-up visits (Table 5). However, we could not find any correlation between func-

Table 1. Basal and ten weeks follow-up LARA asthma symptom scale, functional parameters and AQLQ domain and total scores of the study population. Data are presented as mean ± SD unless otherwise indicated.

	Basal (n= 118)	Follow-up (n= 94)	p value
Cough	2.98 ± 1.17	2.37 ± 1.22	< 0.001*
Wheezing	2.75 ± 1.22	2.31 ± 1.31	< 0.001*
Shortness of breath	2.89 ± 1.09	2.40 ± 1.21	< 0.001*
Asthma attack, median (IQR)	1 (1-2)	1 (1-1.5)	0.302
Chest pain, median (IQR)	2.5 (1-3)	1 (1-3)	0.004*
Awakened at night, median (IQR)	2 (1-3)	1 (1-3)	0.027*
Overall severity	2.69 ± 0.98	2.60 ± 0.85	0.544
How many attacks, median (IQR)	1 (1-2)	1 (1-1.5)	0.415
LASS total, median (IQR)	18.99 ± 5.51	16.46 ± 6.07	< 0.001*
FEV_1 (L)	2.61 ± 0.66	2.54 ± 0.65	0.174
FVC (L)	3.31 ± 0.70	3.28 ± 0.74	0.564
AQLQ activity limitation	3.55 ± 1.15	3.65 ± 1.40	0.347
AQLQ symptoms	4.25 ± 1.32	4.66 ± 1.38	< 0.001*
AQLQ emotional function	4.51 ± 1.64	4.45 ± 1.76	0.659
AQLQ environmental stimuli, median (IQR)	2.63 (1.75-4.50)	2.75 (1.25-4.38)	0.788
AQLQ total score	3.82 ± 1.13	3.94 ± 1.33	0.228

* p< 0.05 was considered significant.

IQR: Interquartile range, LASS: LARA asthma symptom scale, FEV_1: Forced expiratory volume in 1 second, FVC: Forced vital capacity, AQLQ: Asthma Quality of Life Questionnaire.

Table 2. Internal consistency (Cronbach alpha values) of the Asthma Quality of Life Questionnaire.		
Domain (number of items)	When item removed	Cronbach alpha
Activity (11)	1	0.858
	2	0.859
	3	0.855
	4	0.852
	5	0.858
	11	0.865
	19	0.864
	25	0.860
	28	0.854
	31	0.851
	32	0.859
Symptom (12)	6	0.851
	8	0.846
	10	0.859
	12	0.861
	14	0.849
	16	0.869
	18	0.848
	20	0.897
	22	0.847
	24	0.850
	29	0.847
	30	0.848
Emotion (5)	7	0.775
	13	0.798
	15	0.796
	21	0.828
	27	0.772
Environment (4)	9	0.754
	17	0.765
	23	0.746
	26	0.758

Table 3. Item scale correlation for the domains of Asthma Quality of Life Questionnaire.			
AQLQ domain (number of items)	Question numbers/ domain name	r	p
Activity (11)	1	0.605	< 0.001
	2	0.547	< 0.001
	3	0.572	< 0.001
	4	0.537	< 0.001
	5	0.498	< 0.001
	11	0.475	< 0.001
	19	0.541	< 0.001
	25	0.583	< 0.001
	28	0.654	< 0.001
	31	0.595	< 0.001
	32	0.608	< 0.001
Symptom (12)	6	0.537	< 0.001
	8	0.660	< 0.001
	10	0.424	< 0.001
	12	0.232	< 0.001
	14	0.616	< 0.001
	16	0.425	< 0.001
	18	0.659	< 0.001
	20	0.570	< 0.001
	22	0.642	< 0.001
	24	0.531	< 0.001
	29	0.561	< 0.001
	30	0.644	< 0.001
Emotion (5)	7	0.563	< 0.001
	13	0.581	< 0.001
	15	0.564	< 0.001
	21	0.450	< 0.001
	27	0.678	< 0.001
Environment (4)	9	0.554	< 0.001
	17	0.593	< 0.001
	23	0.673	< 0.001
	26	0.658	< 0.001

tional indices and the domains as well as the total score of AQLQ in both visits (p> 0.05 for each).

DISCUSSION

Asthma is a chronic respiratory disease associated with significant social, physical and psychological impact on daily activities of patients. HRQOL has been an important outcome measure in the management of asthma (18,19). Generic measures of HRQOL may be used in different settings, however they are not specific. Simple and feasible tools have been developed to assess asth-

Table 4. Correlation between the domains of AQLQ.

SF-36	Total AQLQ		Activity		Symptom		Emotion		Environment	
	r	p	r	p	r	p	r	p	r	p
Physical functioning	0.623	< 0.001	0.616	< 0.001	0.510	< 0.001	0.381	< 0.001	0.538	< 0.001
Role physical	0.474	< 0.001	0.462	< 0.001	0.388	< 0.001	0.241	< 0.008	0.422	< 0.001
Bodily pain	0.507	< 0.001	0.516	< 0.001	0.435	< 0.001	0.302	< 0.001	0.461	< 0.001
General health	0.590	< 0.001	0.507	< 0.001	0.470	< 0.001	0.522	< 0.001	0.374	< 0.001
Vitality	0.504	< 0.001	0.411	< 0.001	0.453	< 0.001	0.428	< 0.001	0.433	< 0.001
Social functioning	0.580	< 0.001	0.542	< 0.001	0.542	< 0.001	0.427	< 0.001	0.412	< 0.001
Role emotional	0.447	< 0.001	0.496	< 0.001	0.328	< 0.001	0.213	0.020	0.417	< 0.001
Mental health	0.478	< 0.001	0.315	< 0.001	0.478	< 0.001	0.473	< 0.001	0.271	0.003

AQLQ: Asthma Quality of Life Questionnaire and SF-36.

Table 5. Mean values of AQLQ total score according to asthma severity and symptom scores in the basal and follow-up visits.

	AQLQ total score			
	Basal	p value	Follow-up	p value
Asthma Severity				
Mild	4.27 ± 1.12	< 0.001	4.23 ± 1.30	0.006
Moderate	3.19 ± 0.86		3.47 ± 1.26	
LASS				
< 20	4.39 ± 0.99	< 0.001	4.43 ± 1.26	< 0.001
≥ 20	3.07 ± 0.91		3.21 ± 1.33	

LASS: Lara asthma symptom scales, AQLQ: Asthma Quality of Life Questionnaire and SF-36.

ma control. The performance of these instruments on psychometric tests among which good reliability and validity are considered the most important has to be established in countries other than the original form was developed (20). In the present study, we tested the validity and reliability of the Turkish version of AQLQ in a sample of Turkish asthmatic patients and confirmed that the Turkish version of AQLQ was reliable, valid and specific for the evaluation of the quality of life of asthma.

The reliability we observed by internal consistency of each scale showed that the use of the AQLQ subscales was feasible. The Cronbach's alpha coefficients were relatively high (0.746-0.864) and over the acceptable standards for reliability (17). We demonstrated that the homogeneity of the item scale correlations were in an adequate range. The patterns of correlation between the four AQLQ domains showed that the domains were related but measure separate aspects of asthma-specific quality of life. The results were similar to the findings of studies performed on different cultures (21,22).

The validity of quality of life questionnaire is usually evaluated on the basis of the association with other variables which it should theoretically be related (9). Therefore we looked for the correlations of AQLQ with a generic health care measurement SF-36. All domain scores and SF-36 domains were found significantly correlated in both first and second visits; however the relation was weak in the emotional function domain. Puhan et al. reported a fairly good internal consistency between AQLQ and SF-36 where they compared these two quality of life tools in 258 asthmatic patients (23). We also looked for known groups method and assessed the mean AQLQ total scores of patients according to disease severity and symptom score. We showed that as the asthma severity and symptoms increase, AQLQ decreased. Similarly, Sanjuás et al. showed significant differences in AQLQ scores in different severity indices and they found that the degree of dyspnea and all four domain and total scores of AQLQ were strongly correlated (21). It has also been demonstrated that patients with a severe form of disease had the lowest mean scores in all

AQLQ domains and disease severity had a significant impact on the quality of life (22). The symptom scores were found to be significantly improved in the second visit in our study population. The AQLQ total score and activity limitation and environmental stimuli domains also improved, however the change was statistically in significant. The only significant change was observed in AQLQ symptom domain which also improved. This result suggests that specific AQLQ domains are prone to changes in the field that they evaluate and overall AQLQ score is a composite index measuring different indices. We could not show any correlation with pulmonary functions and AQLQ scores. A weak correlation was reported in some other studies (9,24). Functional parameters represent only a part of pathological process, therefore this result was not unexpected for us. Longitudinal validity was demonstrated by the correlation of the AQLQ mean scores and subgroup classifications according to LASS and asthma severity.

In conclusion, we concluded that the Turkish version of AQLQ is valid and reliable HRQOL tool for our population. Since doctors' and patients' perception of asthma severity is different, AQLQ can be used as an efficient indicator of asthmatic patients' health status.

CONFLICT of INTEREST

None declared.

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