Research Article

The validity and reliability of the Turkish version of the Leicester Cough Questionnaire in COPD patients

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Background/aim: The reliability and validity of the Turkish version of the Leicester Cough Questionnaire (LCQ) have been evaluated before. This study aimed to validate the Turkish version of the LCQ in chronic obstructive pulmonary disease (COPD) patients with cough.

Materials and methods: COPD (GOLD B, C, D) patients over age 40 (n = 75) and healthy volunteers as a control group (n = 75) were included. A sociodemographic data form, the LCQ, the Short Form-36 (SF-36) quality of life questionnaire, and the World Health Organization Quality of Life Brief Form for Turkish people were completed. The internal reliability of the LCQ was determined using the Cronbach alpha coefficient (>0.6) and its repeatability by the intraclass consistency coefficient (P < 0.05) was accepted as significant.

Results: For internal consistency, Cronbach alpha coefficients of all subscales of the LCQ, physical, psychological, and social, were found as 0.72, 0.86, and 0.83, respectively, with 0.92 for the total index. There was significant internal consistency for all subscales and the total index (Cronbach alpha coefficients of >0.6). In test–retest reliability, the correlation coefficient ranged between 0.71 and 0.80 for each question and was calculated as r = 0.89 for total LCQ score (P < 0.001).

Conclusion: The Turkish version of the LCQ has been found to have acceptable reliability and validity for use in Turkish COPD patients with chronic cough.

Key words: Chronic obstructive pulmonary disease, cough, quality of life, Leicester Cough Questionnaire

1. Introduction

Chronic cough, due to many etiologies, is defined as cough that lasts longer than 8 weeks and has a significant effect on the quality of life of the patient. Chronic obstructive pulmonary disease (COPD) is clinically characterized by progressive dyspnea, cough, and sputum expectoration. It is important to demonstrate airway limitation in diagnosing COPD, but it is also a cause of chronic cough (1). The prevalence of chronic productive cough in COPD is 15%–44% in males and 6%–17% in females. It is strongly associated with smoking and older age (2). Chronic productive cough in COPD may also be associated with severe exacerbations requiring hospitalization, affecting quality of life and general health status (3,4).

The Leicester Cough Questionnaire (LCQ) is a quality of life questionnaire on chronic cough developed in the UK. The questionnaire is short and easy to use and its validity assessment is good. The Turkish reliability and validity of this questionnaire were recently established (5).

The LCQ has been shown to be reproducible and a solution provider in patients with chronic and acute cough (6).

Although cough is a frequent symptom, its impact on health status in COPD patients is not known. There is not any validated, cough-specific health status measurement for COPD patients (7). There is also no Turkish questionnaire that evaluates chronic cough in COPD patients. We aimed to validate the Turkish version of the LCQ in COPD patients with cough.

2. Materials and methods

This research is a cultural adaptation study of the methodological (validity and reliability) type.

Approval of the Manisa Celal Bayar University Ethics Committee was obtained (20478486-274/24.06.2015). Seventy-five Turkish COPD Patients (GOLD B, C, D) admitted to the Chest Diseases Clinic of Manisa Celal Bayar University Hospital, who were over 40 year of age and able to respond to the questions thoroughly, were

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811

included in the study (8). Seventy-five healthy volunteers over 40 years old with no chronic disease were included as a control group. Surveys were completed at baseline and 2 weeks later by the patient group.

The data collection package of the study was divided into 4 parts, as described below.

2.1. Sociodemographic data form
Sex, age, educational status, comorbidity, and smoking history were recorded.

2.2. Leicester Cough Questionnaire (LCQ)
The LCQ is a quality of life questionnaire associated with chronic cough developed in the UK. It includes 19 subjects and 3 fields (physical, psychological, and social). Subjects for the LCQ were selected by the clinical impact factor method. This method selects topics that the patients identify as problems and places them according to the importance assigned to them. The topics are divided into areas using clinical logic (9). The person fills out the questionnaire according to a seven-unit Likert response scale. High scores indicate better health status. The total score is the sum of the 3 domains (physical, psychological and social). The Turkish reliability and validity of the LCQ in patients with chronic cough were established by Akis Gonen et al. (5).

2.3. Short Form-36 (SF-36) Quality of Life Questionnaire
The SF-36 was developed by the Rand Corporation in 1992. It includes questions about physical function (10 questions), social function (2 questions), physical role difficulty (4 questions), role of mental condition (3 questions), mental health (5 questions), energy/vitality (4 questions), pain (2 questions), general perception of health (5 questions), and perception of change in health over the last 12 months (1 question). It can evaluate the positive aspects of the health situation as well as negative aspects. The score obtained in this scale, consisting of 36 questions with 8 subtitles, is between 0 and 100 and a special score is obtained for each subtitle. When the score is higher, it means that the health condition is better. The SF-36 is a sensitive questionnaire for assessing changes in the quality of life in COPD patients (10). A Turkish validity study was conducted by Koçyiğit et al. (11).

2.4. Short Form of the World Health Organization Quality of Life Questionnaire for Turkish People (WHOQOL-BREF-TR)
The WHOQOL-BREF has a total of 26 questions, including two questions about 'general perceived quality of life' and 'perceived health status'. The WHOQOL-BREF-TR was modified by adding a question during Turkish validity studies, so it consists of 27 questions including 5 areas that are physical, mental, social, environmental, and national environment with 0–20 points. The score increases as quality of life improves. Turkish validity and reliability studies for WHOQOL-BREF-TR were performed by Eser et al. (12).

2.5. Statistical method
Internal structure consistency (Cronbach alpha coefficient of >0.6 being significant) and test–retest reliability (P < 0.05 being statistically significant) have been measured for reliability analyses of the scale used in this study. Internal structure consistency examines how scale items interact in relation to each other and shows that scale items measure approximately the same thing. In other words, it investigates whether the questions in the scale form a whole to explain a homogeneous construction. It can be between 0 and 1. The range in which the alpha coefficient can be found and therefore the confidence level of the scale is as follows: $0.00 \leq \alpha < 0.40$ means the scale is not reliable, $0.40 \leq \alpha < 0.60$ means the scale has low reliability, $0.60 \leq \alpha < 0.80$ means the scale is reliable, and $0.80 \leq \alpha < 1.00$ means highly reliable.

For this purpose, the Cronbach alpha coefficient and item-total score correlations have been calculated for each item in the scale and for all subscales separately. For the test–retest reliability, the test was performed twice in the patient group at baseline and again 2 weeks later, to assess the stability of the scale.

'Validity together' has been investigated for validity. For this purpose, comparison of the SF-36 and WHOQOL-BREF-TR, which were previously validated in Turkish, was used. The relationship between the LCQ and the SF-36 and WHOQOL-BREF-TR was calculated by Pearson correlation coefficient. P < 0.05 was considered statistically significant.

Chi-square, ANOVA, and Student t-tests were used to compare sociodemographic and clinical features with LCQ scores. P < 0.05 was considered statistically significant.

For the statistical analyses, SPSS 15.0 for Windows 15.0 was used.

3. Results
Most of the 75 patients were male (94.6%) and the mean age was 62.32 ± 7.8 years. The sociodemographic findings of the 75 patients and the 75 control subjects are shown in Table 1.

A significant difference in sex and age was found (P < 0.05) among the sociodemographic characteristics of the groups. However, a limitation of the study was that most of the patients with cough were male while in the control group most subjects were female. A similar pattern was observed for the smoking status and educational status of the patients (P < 0.05).

3.1. Results of reliability of the questionnaire

3.1.1. Internal consistency
The Cronbach alpha coefficient for each subscale and for all tests was calculated. It was observed that all subgroups

Table 1. Social demographic characteristics of patients and control group.

		COPD group (n = 75)	Control group (n = 75)	P
Age, years, mean ± SD		62.32 ± 7.8	55.45 ± 8.0	<0.05
Sex, n, (%)	Female	4 (5.4%)	37 (49.3%)	<0.05
	Male	71 (94.6%)	38 (50.7%)	
Educational level, n, (%)	Literate	17 (22.6%)	11 (14.6%)	<0.05
	Primary education	52 (69.3%)	25 (33.3%)	
	High school	5 (6.6%)	16 (21.3%)	
	University	1 (1.3%)	23 (30.6%)	
Comorbidities, n, (%)	Yes	31 (41.3%)	26 (34.6%)	0.251
	No	44 (58.7%)	49 (65.4%)	
Smoking status, n, (%)	Nonsmoker	1 (1.3%)	40 (53.3%)	<0.05
	Exsmoker	54 (72.0%)	19 (25.5%)	
	Current smoker	20 (26.7%)	16 (21.3%)	

had significant internal consistency. For the physical, psychological, and social subgroups of the LCQ, the Cronbach alpha coefficient was 0.72, 0.86, and 0.83, respectively (Table 2).

Item-total correlation coefficients between 0.55 and 0.67 were obtained for the whole scale evaluation and the Cronbach alpha coefficient was 0.89 (Table 2). The medium and high level item-total correlation coefficients for all items were determined.

In the internal consistency evaluation, the Cronbach alpha coefficient for the subgroups and the whole scale was >0.6, supporting the test's reliability.

3.1.2. Test–retest method

The relationship between the scores of the patients as a result of test–retest was statistically evaluated by the Pearson correlation test. In the test–retest reliability, the correlation coefficient of the subgroups of the LCQ ranged from 0.71 to 0.80 (P < 0.001). At the same time, there was a high correlation for total LCQ score in test–retest reliability (r = 0.89, P < 0.001) (Table 3).

The test–retest reliability was examined for each question and the correlation coefficient was found to be between 0.61 and 0.78 (P < 0.001).

There was no statistically significant difference between LCQ total and subscale scores in the first and second evaluation of the patient group (P > 0.05) (Table 3).

When the relationship between the LCQ subscales and the SF-36 subscales was examined, the correlation values (including each subscale) supported a significant relationship between the two tests (P < 0.05). The highest correlation was found between the physical, psychological, and social subscales and total scores of the LCQ and SF-

36 general health subscale (respectively r = 0.62, 0.54, 0.57, 0.6), whereas the lowest correlation for the physical subscale of LCQ (r = 0.25) was with the emotional role difficulties of the SF-36, and for other subscales and the total score of LCQ it was with the SF-36 physical function subscale (respectively r = 0.21, 0.23, 0.57).

Correlation between the LCQ subscales and the WHOQOL-BREF-TR subscales also supported the compatibility of the two tests (P < 0.05). The lowest correlation between the physical subscale and total score of LCQ was with the WHOQOL-BREF-TR social relationships (respectively r = 0.36, 0.41) and the highest correlation was with the physical area (r = 0.49).

4. Discussion

Our study evaluating the validity and reliability of the Turkish version of the LCQ in COPD patients has shown that the Turkish version of the LCQ provides reliable measurement in COPD patients as well as in the general population.

Chronic cough is an important symptom that affects the quality of life of patients and has physical, social, and psychosocial effects. Studies have been performed to evaluate the impact of it on quality of life in different patient groups (13–17). Although cough is one of the three most common complaints of COPD patients, it is usually treated as a natural symptom by the effect of smoking in this group of patients. There is also no study done regarding cough symptom in COPD. This could be likely due to the lack of valid assessment tools.

When we compared the patient and control groups in our study, male sex, older age, and smoking were

Table 2. Item-total statistics for the LCQ subscales and total index.

	Corrected item-total correlation (r), subscales / total index	Alpha value when this item is not available, subscales / total index
LCQ1 (Physical)	0.59 / 0.61	0.69 / 0.87
LCQ2 (Physical)	0.58 / 0.61	0.70 / 0.86
LCQ3 (Physical)	0.58 / 0.60	0.67 / 0.86
LCQ4 (Psychological)	0.65 / 0.60	0.72 / 0.87
LCQ5 (Psychological)	0.65 / 0.58	0.75 / 0.89
LCQ6 (Psychological)	0.68 / 0.63	0.77 / 0.90
LCQ7 (Social)	0.61 / 0.68	0.73 / 0.84
LCQ8 (Social)	0.66 / 0.58	0.76 / 0.86
LCQ9 (Physical)	0.52 / 0.65	0.67 / 0.86
LCQ10 (Physical)	0.50 / 0.56	0.69 / 0.84
LCQ11 (Physical)	0.53 / 0.64	0.67 / 0.90
LCQ12 (Psychological)	0.69 / 0.61	0.80 / 0.88
LCQ13 (Psychological)	0.69 / 0.57	0.74 / 0.91
LCQ14 (Physical)	0.52 / 0.57	0.69 / 0.84
LCQ15 (Physical)	0.58 / 0.64	0.69 / 0.90
LCQ16 (Psychological)	0.66 / 0.65	0.72 / 0.87
LCQ17 (Psychological)	0.74 / 0.63	0.81 / 0.94
LCQ18 (Social)	0.69 / 0.62	0.77 / 0.92
LCQ19 (Social)	0.70 / 0.65	0.78 / 0.88

Physical subgroup: alpha: 0.72.
Psychological subgroup: alpha: 0.86.
Social subgroup: alpha: 0.83.
Total: alpha: 0.89.

Table 3. Test–retest reliability of the Leicester Cough Questionnaire.

	First assessment	Second assessment	r / P
Physical, mean ± SD	4.80 ± 1.25	4.75 ± 1.29	0.71 / 0.58
Psychological, mean ± SD	4.73 ± 1.44	4.67 ± 1.37	0.80 / 0.51
Social, mean ± SD	4.29 ± 1.68	4.25 ± 1.72	0.79 / 0.58
Total, mean ± SD	13.82 ± 4.36	13.67 ± 4.39	0.89 / 0.42

significantly different in patients with chronic cough (P < 0.05). Mello et al. found the rate of women to be 72% in patients with chronic cough complaints (14). This is usually explained by increased cough reflex sensitivity in women. It has been reported that although men reported more severe cough complaints, women had more cough-related applications and cough further deteriorated the quality of life in women (15–17). Kelsall et al. found no difference between women and men in LCQ scores (18). In our study, we found cough to be more common in men.

However, this result may be influenced by the fact that most of the patients were male and the control group was mostly female.

The effect of tobacco on cough is known. In a case-control study of 2000 people performed by Jansen et al., there was an increased prevalence of chronic cough among smokers (19). In our study, smoking history, which is the most important risk factor of COPD, was more frequent in the group of patients with chronic cough than in the control group (98% and 46%, respectively). There were

patients in both groups who continued to smoke actively (n = 20 and 16, respectively). Smoking was more frequent in the patient group, which may be another limiting factor in our study.

Internal consistency has been determined for each subscale (physical, psychological, social) and for the whole test in our study in which we tested the Turkish validity and reliability of the LCQ for COPD patients (respectively Cronbach alpha coefficients of 0.72, 0.86, 0.83, and 0.89). The weakest internal consistency was in the physical subgroup. Three items (questions 9, 10, and 14) related to hoarseness, odor sensitivity, and sleep influence were the questions that provided the greatest contribution to this low value. In a validation-accuracy study of patients with COPD from the Netherlands, the lowest Cronbach alpha coefficient was also obtained with regard to energy loss with hoarseness and odor sensitivity (7). Considering that most COPD patients are smoking, and most of them complain about hoarseness and weakness, these questions may be considered as weaker indicators of chronic cough in COPD patients.

Our study showed that there was test–retest reliability of the Turkish version of the LCQ for each subscale and the whole scale in COPD patients.

In the validity and reliability study of the LCQ Dutch version, it was seen that the LCQ was a highly reproducible and change-sensitive questionnaire. It was stated that this questionnaire could be used to assess and evaluate the clinical outcomes associated with coughing (20). In a study conducted by Berkhoff et al. in COPD patients, it was also found that the LCQ was reproducible and that the correlation coefficient scores of test–retest reliability for the subscales and total scale were above 0.70, similar to our study (7). These data support the claim that the LCQ is reproducible in COPD patients with chronic cough.

When we examined the relationship between LCQ subscales and SF-36 subscales in our study, it was seen that there was a significant correlation in all subunits, similar to the literature (<0.05). This supports the results of the study by Kalpaklıoğlu et al. in patients with postnasal drip, asthma, and gastroesophageal reflux, which were the most common causes of chronic cough (21). In the Turkish validity study of the LCQ in patients with chronic cough, the relationship between LCQ subscales and SF-36 subscales was found to be significant, in parallel with our study (5). Kwon et al. also found it compatible with the SF-36 in a validity and reliability study with 202 patients with chronic cough (Cronbach alpha correlation coefficient: 0.42–0.58) (22).

French et al. assessed the LCQ as a shorter, usable questionnaire in a validation study of patients with COPD in France using the Cough-Specific Quality of Life Questionnaire (23). Sönnerfors et al. also showed that the questionnaire correlated with the Swedish version of the LCQ with the St George's Respiratory Questionnaire and the COPD Assessment Test, and indicated that the questionnaire could be used (24). Reychler et al. also tested the French version of the questionnaire with the Cough and Sputum Assessment Questionnaire and found a strong correlation (25). The study of Birring et al. also showed that the LCQ is suitable for use in many areas. It is firstly useful in detecting changes in chronic cough patients and secondly is influential in assessing health-related conditions affected by cough and showing how it changes over time. Finally, it can be used in clinical trials evaluating the efficacy of new treatments for cough and quality of life (9).

In our study, there was also a correlation between LCQ subscales and WHOQOL-BREF-TR subscales, and there was a significant correlation between the two tests (P < 0.05). Akis Gonen et al. found a statistically significant correlation between LCQ subscales and WHOQOL-BREF-TR subscales in Turkish validity and reliability studies in patients with chronic cough (5). This is in line with our research results.

The most important limitation of our research was that the patient group consisted mainly of males and the control group consisted of mainly females. The fact that smoking was more frequent in the patient group has been considered another factor of limitation. It has been thought that the main cause of these differences was the COPD patients who constituted the study group. Another limitation was the age difference between the study and control group. The most important cause of this age difference may that COPD patients are predominantly in the older age group, and it was difficult to find healthy individuals for the control group in this age group.

The LCQ is a short, easily applicable, and reproducible questionnaire in COPD patients. It has also been validated with health-related quality of life questionnaires. Our data support that the Turkish version of the LCQ is a valid and reliable questionnaire that can be used in patients with chronic cough and asthma as well as COPD patients. Using the Turkish version of this questionnaire in COPD patients with chronic cough may contribute to the evaluation of patients' quality of life and the approach to coughing.

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