The reliability of an Arabic translation of the chronic obstructive pulmonary disease assessment test

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ABSTRACT

الأهداف: إحداث نسخة عربية مطابقة لاختبار تقييم مرض الانسداد الرئوي المزمن ودراسة مدى دقتها.

الطريقة: اعتمدت هذه الدراسة على المسح المقطعي الذي استمر خلال الفترة من يونيو إلى سبتمبر 2010م في كل من مدينة الملك عبدالعزيز الطبية ومستشفى الملك خالد الجامعي في الرياض، المملكة العربية السعودية. وتم إجراء الدراسة على مرحلتين: المرحلة الأولى وتضمنت ترجمة الاستبيان من اللغة الانجليزية إلى اللغة العربية ومن ثم ترجمتها مرة أخرى إلى اللغة الانجليزية، وعمل مقارنة بين النسختين واختبار استطلاعي. أما المرحلة الثانية فتضمنت تقييم مدى مصداقية الاستبيان على فترتين (الفحص الأول، وإعادة الفحص) للمرضى الذين تلقوا علاجاً كاملاً من الانسداد الرئوي المزمن.

النتائج: لقد كان عدد المشاركين في الاستبيان 45 مشاركاً، وأشارت نتائج الدراسة إلى أن متوسط نتيجة الاستبيان وصلت إلى 10.7±5.8 عند الفحص الأول، و9.2±4.5 عند إعادة الفحص، وقد بلغ عامل التطابق 0.9 (p=0.000076). لقد ظهر أقوى عامل تطابق في الفقرة الخاصة بالاستطاعة على مغادرة المنزل بكل ثقة بغض النظر عن حالة الرئتين وبقيمة (0.92 (p=0.000082)، أما أضعف عامل تطابق فكان في الفقرة الخاصة بالنوم بشكل سليم وبقيمة 0.53 (p=0.007).

خاتمة: لقد وجدنا أن النسخة العربية من استبيان تقييم مرض الانسداد الرئوي المزمن كانت سهلة الاستخدام ودقيقة لتعكس مدى مصداقيتها واستقرارها مع تغير الوقت ولكل الفقرات.

Objectives: To produce a conceptually equivalent Arabic version of the Chronic Obstructive Pulmonary Disease (COPD) Assessment Test (CAT), and to assess its reliability.

Methods: A prospective observational study was carried out from June 2010 to September 2010 at King Abdulaziz Medical City and King Khalid University Hospital, Riyadh, Saudi Arabia. We conducted this study in 2 phases. Phase 1: the translation of the CAT from English to Arabic, through forward and backward translation, as well as pilot testing. Phase 2: assessment of the test-retest reliability of the CAT for 45 patients with COPD who received optimal care by their pulmonologist.

Results: This study was conducted on 45 participants. The CAT mean total (± SD) score at the test session was 10.7±5.8, and 9.2±4.5 at the re-test session. The interclass correlation of the total score was 0.9 (p=0.000076). The strongest correlation was for the item of confidence in leaving home with a value of 0.92 (p=0.000082), whereas the weakest was for the item related to sleep with a value of 0.53 (p=0.007).

Conclusion: The Arabic version of the CAT was found to be easy to administer, reliable, and had a strong interclass correlation reflecting stability over time and across the items.

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Assessing health related quality of life (HRQL) has gained more popularity in the past 3 decades to measure the outcome of different diseases and their management modalities.[1-3] Chronic obstructive pulmonary disease (COPD) is not an exception, as it is considered a leading cause of morbidity and mortality where 9-10% of adults over the age of 40 are suffering

from the disease, namely, approximately 80 million individuals worldwide.[4] Based on these numbers, we estimate that 4 million individuals are suffering from COPD in the Arabic-speaking countries. This is supported with the fact that smoking prevalence in the third-world countries has doubled over the past 3 decades as proposed by the World Health Organization.[5] Though the available HRQL instruments such as respiratory disease questionnaire (CRQ) and the St. George's Respiratory Questionnaire (SGRQ) are valid and reliable, these are complex and not easy to interpret by patients and healthcare workers.[6,7] The availability of valid and reliable translations to different languages has further limited the utilization of these HRQL instruments in different regions of the world. The COPD assessment test (CAT) was introduced as a shorter form of the SGRQ and is considered to be a valid, self-administrated, and a simple instrument to quantify the impact of COPD in routine practice.[8] This instrument also facilitates and supports the communication between patients and healthcare workers by obtaining reliable and valid information. Based on the psychometric properties and a qualitative research, it was short-listed from 21 to 8 items.[9] The 8 items of the CAT cover cough, sputum production, chest tightness, breathlessness going up a stair/hill, activity limitation at home, confidence in leaving home, sleep, and energy. Patients are asked to grade their response in each item using a semantic 6-point scale with contrasting adjectives. The total score is calculated where higher score represents higher impact of the disease and worse health. Due to the unavailability of widely used common questionnaires like the CRQ and the SGRQ, the Arabic Version of the CAT has prime importance in Arabic-speaking countries. More than just filling the gap, it can be used widely due to its characteristics as a short, easy, and patient-completed instrument. Therefore, the objective of this study was to produce an equivalent Arabic version of the CAT and to assess its reliability.

Methods. This was a prospective observational study, which was carried out from June to September 2010 at the pulmonary rehabilitation clinic at King Abdulaziz Medical City, and the outpatient pulmonary clinic at King Khalid University Hospital, Riyadh, Saudi Arabia. The study consisted of 2 phases: translation process and assessing the test-retest reliability of the translated CAT. Ethical approval was obtained from the Institutional Review Board of King Abdulaziz Medical City and King Khalid University Hospital, Riyadh, Saudi Arabia. The study also followed the principles of the Helsinki Declaration.

Translation. The first phase of the study was the translation of the CAT from the source language (English) to the target language (Arabic). Two translators who were fluent in both languages performed the forward translation independently. We then reconciled the first Arabic version. The other 2 translators with native and source language independently conducted the back translation to English. They were blinded to the original documents. We then compared the 2 translations with the original CAT. Thereafter, a final Arabic version was produced after verifying the consistency of the forward and backward translations (**Figures 1 & 2**). It was tested initially on 5 randomly selected patients to ensure that the final draft is clear, understandable, and acceptable. After completing the translation process, the reliability process was initiated.

Test-retest reliability. The second phase of the study was the administration of the Arabic CAT. A sample of 45 patients was selected to assess the test-retest reliability by ensuring adequate certainty of 95% to test a difference of 15% between the 2 times the CAT adminstarted. The participants were selected using a simple random technique. A list of random numbers was generated and used to select the list of eligible participants in each of the 2 institutions. After signing the informed consent form, the CAT was self-administrated initially, and then 1-2 weeks later to assess test-retest reliability. Those participants were adults aged 40-75 years with the clinical diagnosis of COPD in a stable condition for at least 4 weeks, and free of significant co-morbidities. Their ratio of forced expiratory volume in one second to forced vital capacity (FEV1/FVC) should be less than 70%. Those participants who were illiterate, had significant co-morbidities, or did not attend the test re-test sessions were excluded from the study. In addition to filling the CAT, participants provided information on their demographic data (age, gender, duration of diseases, and level of education). Moreover, their information on basic investigations was collected including: measurement of FEV1, FVC, FEV1/FVC, arterial blood gases (ABG), and 6 minute walking test (6MWT) as per the American Thoracic Society criteria.[10,11] The CAT scoring was 0-40 points. A score of more than 30 indicates a very high impact of the disease, more than 20 a high impact, 10-20 a medium impact, and less than 10 a mild impact.[12]

Statistical analysis. Description of continuous variables was carried out by calculating the mean and standard deviation. The reliability was studied by Cronbach alpha to measure the internal consistency of the CAT and the intraclass correlation coefficient for the test-retest reliability. A value of 0.7 was considered acceptable for both the Cronbach alpha and the intraclass

Figure 1 - The final Arabic version of the COPD assessment test. COPD - chronic obstructive pulmonary disease

correlation coefficient. All analyses were conducted using the Statistical Package for Social Sciences (SPSS Inc, Chicago, IL, USA), version 16.

Results. This study enrolled 45 patients with COPD. Their average age was 61.0±8.7 years. There were 9 female patients (20%) and 36 male patients (80%). **Table 1** presents the demographic characteristics of the participants. Based on the spirometric classification of COPD severity, one participant had mild disease (2.2%), 24 (53.3%) had moderate disease, 18 (40%) had severe disease, and 2 (4.4%) had very severe disease. Pertaining to the medications, it was found that 20 patients (44.4%) used an inhaled corticosteroid agent, 34 (75.6%) used a long acting bronchodilator agent, and 33 (26.7%) used tiotropium bromide. **Table 2** shows that most of the responses on the CAT were toward lower values as the participants were in a stable condition during the study period. The mean total score was 10.7 (±5.8) at the test session and 9.2 (±4.5) at the re-test session. Though there was variability per items, the interclass correlation of the total score was strong with a value of 0.90 for the total score (p=0.000076) (**Table 2**). The strongest correlation was for the item of confidence in leaving home with a value of 0.92 (p=0.000082), whereas the weakest was for the item

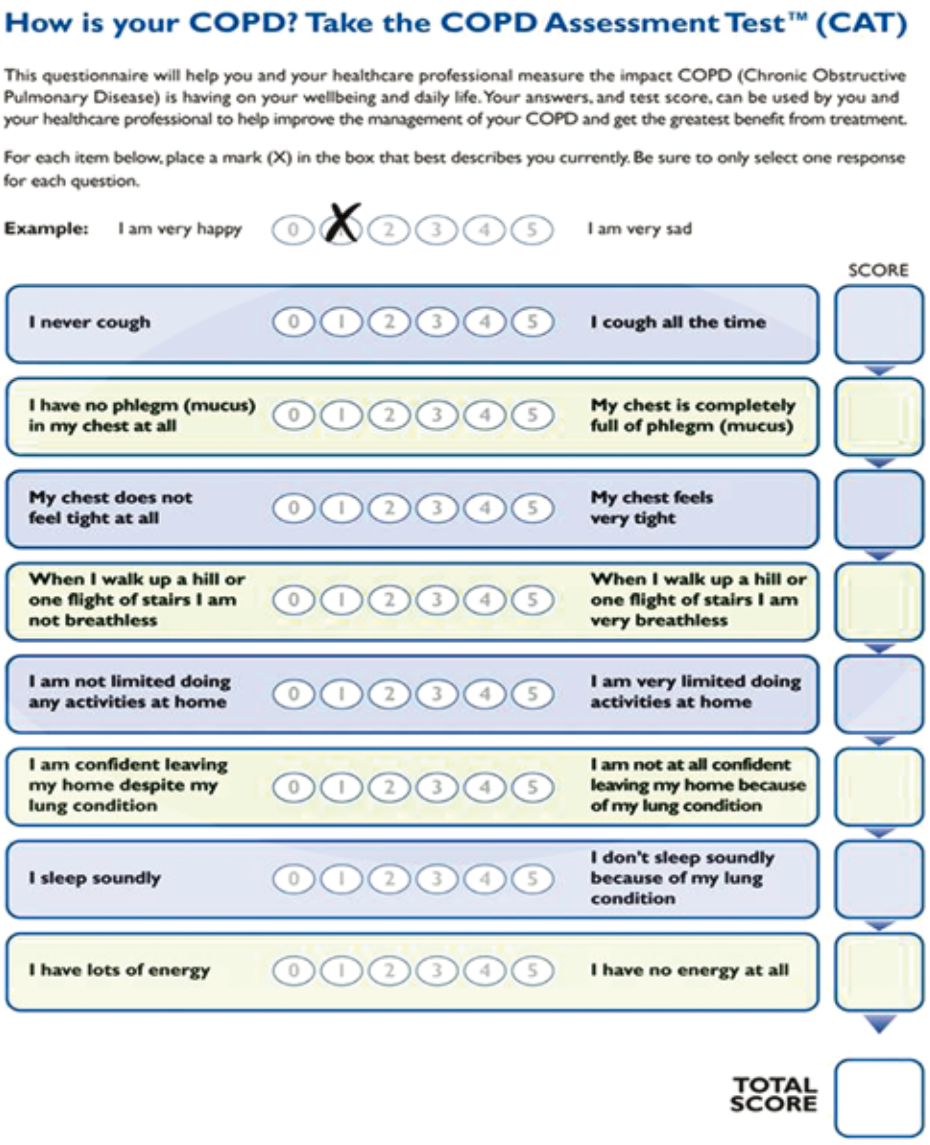

Figure 2 - The original English version of the COPD assessment test. COPD - chronic obstructive pulmonary disease

related to sleep with a value of 0.53 (p=0.007). We correlated the CAT scores with different participant's characteristics (**Table 3**).

Discussion. The Arabic version of the CAT was found to be easy to administer, reliable, and had a strong interclass correlation reflecting stability over time and across the items. Such an instrument can be a valuable tool to help healthcare providers in their clinical judgment when assessing patients with COPD.[13] The currently available COPD-specific instruments like CRQ and SGRQ are valid, interpretable, responsive, and reliable.[14-16] Though these have been tested in different clinical situations and have been adopted in different institutes, there are very view studies in the Arabic-speaking countries that utilized either CRQ or SGRQ.[17] This is attributed to the lack of translation through a validated process, the complexity of interpreting these questionnaires, and limited trained healthcare professionals who can utilize them.

The CAT addresses both respiratory symptoms and complaints reflecting disease impact such as sleep disturbance, decreased energy levels, and limitations of daily activities.[7] The main role of the CAT is to supplement the information obtained by the physician and the data gathered from other tests such

as lung functions tests and CT of the chest. It has the advantage over the newly developed COPD assessment questionnaire (COPD-AQ) that it tests both symptoms and impact of the disease, while COPD-AQ assesses symptoms only.[18] Published data on the CAT is still scarce. However, an abstract presented at the American Thoracic Society meeting in 2010,[19] showed that the CAT can detect improvement after recovery from an exacerbation and can discriminate between those who showed improvement from those who did not. To date, there is also limited data available on minimally clinical significant change in the CAT. However, the majority treatment responders from their exacerbation had a CAT score improvement by >2 points.[7]

In our study, the mean the total score of the CAT in the study population was 10.7±5.8 with a strong interclass correlation of 0.9 (p=0.000076) between test-retest sessions. Though the mean FEV1 was 49.7% and most of the participants had either moderate or severe disease (93.3%), the mean score of the CAT was in the area of mild-moderate impact of the disease. This can be explained by the fact that the recruited participants were those in a stable clinical condition for at least 4 weeks. Another explanation would be the adaptation of patients with COPD to gradual decline of lung function prior to seeking medical care.[20] Moreover, the above can also explain the weak correlation of the mean CAT with FEV_1 and FEV_1/FVC of 0.09 and 0.25. The highest impact of the disease was noticed on the item related to shortness of breath going uphill. This item would identify dyspnea that has been adopted by the patient during their daily activities.[7] Johns et al[8] found that the breathlessness on stairs/hills item has the greatest discriminative power for those patients with milder disease; while the confidence leaving home item discriminated better in patients with more severe disease. In our study, the item of confidence leaving home was the most reliable as reflected by an interclass correlation of 0.92 (p=0.000082). Though BMI of ≤21 was associated with poor prognosis,[21] it was weakly

Table 1 - Demographic data of 45 participants with chronic obstructive pulmonary disease admitted to King Abdulaziz Medical City and King Khalid University Hospital, Riyadh, Saudi Arabia.

Characteristics	Mean	Standard deviation
Age (years)	61.0	8.7
Body mass index (Kilogram/meter^2)	28.3	5.0
Disease duration (years)	11.2	8.3
Number of exacerbation in the past 12 months	0.7	1.4
Number of admissions in the past 12 months	0.4	0.8
Smoking history (pack-year)	50.2	36.6
FEV_1 (%)	49.7	13.6
FVC (%)	76.5	13.6
FEV_1/FVC (%)	65.0	6.2
pH	7.4	0.03
Partial arterial carbon dioxide tension ($PaCO_2$)	44.7	7.0
Partial arterial oxygen tension (PaO_2)	68.7	11.3
6 minutes walk distance	342.1	76.8

FEV_1 - The percentage of forced expiratory volume in one second, FVC - percentage of forced vital capacity

Table 2 - Interclass correlations of the COPD assessment test.

Items	Test Mean (±SD)	Re-test Mean (±SD)	Interclass correlations	*P*-value
Cough	1.4±1.1	1.0±0.8	0.82	0.00023
Sputum production	1.4±1.3	1.1±1.1	0.87	0.00067
Chest tightness	1.6±1.2	1.4±1.0	0.83	0.00046
Breathlessness going up stairs/hills	2.7±1.3	2.5±1.1	0.83	0.00035
Activity limitation at home	1.1±1.4	0.9±1.0	0.88	0.00012
Confidence in leaving home	1.0±1.3	1.1±1.3	0.92	0.000082
Sleep	0.6±1.0	0.4±0.8	0.53	0.00036
Energy	1.0±1.1	0.8±0.9	0.84	0.00027
Total score	**10.7±5.8**	**9.2±4.5**	**0.90**	**0.000076**

COPD - chronic obstructive pulmonary disease

Table 3 - The correlations of the CAT score administered at first and second visit with different patient characteristics.

Characteristic	Visit 1		Visit 2	
	Correlation	*P*-value	Correlation	*P*-value
BMI	-0.02	0.89	-0.03	0.87
Duration (years)	0.28	0.07	0.07	0.66
FEV_1 (%)	0.09	0.55	0.028	0.85
FEV_1/FVC (%)	0.25	0.1	0.22	0.16
6MWD	-0.25	0.11	-0.08	0.60

FEV_1 - The percentage of forced expiratory volume in one second, FVC - percentage of forced vital capacity, CAT - COPD assessment test, 6MWD - 6-minute walk test, BMI - body mass index

correlated with the CAT score. This is probably due to the fact that the mean BMI in our study population was 28.3, with only 5 patients <22. The same explanation can be extended to the 6MWD where the mean was 342 meters. The small sample size limits any conclusion from these 2 parameters, and we propose the need for larger studies in our setting.

Though our translation of the CAT was reliable with strong interclass correlation, it was limited by the unavailability of another validated COPD specific questionnaire during the study period. This would be another area for research in Arabic-speaking countries. Another limitation is related to the fact that participants in this study were on optimal treatment based on the assessment of their referring pulmonologist. However, it was difficult to assess their stability, as there is a universal ambiguity in defining stability.[22]

In conclusion, the Arabic version of the CAT was found to be easy to administer, reliable, and had a strong interclass correlation reflecting stability over time and across the items.

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