Portuguese-language version of the Chronic Respiratory Questionnaire: a validity and reproducibility study*

Versão em português do *Chronic Respiratory Questionnaire*: estudo da validade e reprodutibilidade

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Abstract

Objective: To determine the validity and reproducibility of a Portuguese-language version of the Chronic Respiratory Questionnaire (CRQ) in patients with COPD. **Methods:** A Portuguese-language version of the CRQ (provided by McMaster University, the holder of the questionnaire copyright) was applied to 50 patients with COPD (70 ± 8 years of age; 32 males; FEV_1 = 47 ± 18% of predicted) on two occasions, one week apart. The CRQ has four domains (dyspnea, fatigue, emotional function, and mastery) and was applied as an interviewer-administered instrument. The Saint George's Respiratory Questionnaire (SGRQ), already validated for use in Brazil, was used as the criterion for validation. Spirometry and the six-minute walk test (6MWT) were performed to analyze the correlations with the CRQ scores. **Results:** There were no significant CRQ test-retest differences ($p > 0.05$ for all domains). The test-retest intraclass correlation coefficient was 0.98, 0.97, 0.98 and 0.95 for the dyspnea, fatigue, emotional function and mastery domains, respectively. The Cronbach's alpha coefficient was 0.91. The CRQ domains correlated significantly with the SGRQ domains ($-0.30 < r < -0.67$; $p < 0.05$). There were no significant correlations between spirometric variables and the CRQ domains or between the CRQ domains and the 6MWT, with the exception of the fatigue domain ($r = 0.30$; $p = 0.04$). **Conclusions:** The Portuguese-language version of the CRQ proved to be reproducible and valid for use in Brazilian patients with COPD.

Keywords: Quality of life; Pulmonary disease, chronic obstructive; Questionnaires.

Resumo

Objetivo: Verificar a validade e a reprodutibilidade de uma versão em português do *Chronic Respiratory Questionnaire* (CRQ) em pacientes com DPOC. **Métodos:** A versão em português do CRQ (fornecida pela Universidade de McMaster, detentora dos direitos do questionário) foi aplicada a 50 pacientes portadores de DPOC (32 homens; 70 ± 8 anos; VEF_1 = 47 ± 18% predito) em dois momentos, com intervalo de uma semana. O CRQ tem quatro domínios (dispneia, fadiga, função emocional e autocontrole) e foi aplicado em formato de entrevista. O *Saint George's Respiratory Questionnaire* (SGRQ), já validado em português, foi utilizado como o critério de validação. A espirometria e o teste da caminhada de seis minutos (TC6) foram realizados para a análise das correlações com os valores do CRQ. **Resultados:** Não foram observadas diferenças significativas entre a aplicação e a reaplicação do CRQ ($p > 0.05$ para todos os domínios). O coeficiente de correlação intraclasse entre a aplicação e a reaplicação foi de 0,98; 0,97; 0,98 e 0,95 para os domínios dispneia, fadiga, função emocional e autocontrole, respectivamente. O coeficiente alfa de Cronbach foi 0,91. Os domínios do CRQ se correlacionaram significativamente com os domínios do SGRQ ($-0.30 < r < -0.67$; $p < 0,05$). Não houve correlação entre as variáveis espirométricas e os domínios do CRQ e nem entre esses domínios e o TC6, exceto para o domínio fadiga ($r = 0,30$; $p = 0,04$). **Conclusões:** A versão em português do CRQ demonstrou ser reprodutível e válida em pacientes brasileiros portadores de DPOC.

Descritores: Qualidade de vida; Doença pulmonar obstrutiva crônica; Questionários.

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Financial support: This study received financial support from the *Coordenação de Aperfeiçoamento de Pessoal de Nível Superior* (CAPES, Coordination of the Advancement of Higher Education).

Submitted: 16 February 2009. Accepted, after review: 16 April 2009.

Introduction

The respiratory disease COPD is characterized by chronic airflow limitation that is usually progressive and not fully reversible. It presents some significant extrapulmonary effects[1] that can decrease functional capacity and impair social interaction in such patients,[2] as well as negatively affecting their well-being and quality of life.[3]

The use of subjective measures (such as questionnaires) in order to assess the quality of life of COPD patients in scientific research has been widely accepted.[4] The creation of reliable and valid questionnaires has contributed to a substantial increase in their use.[5]

Two of the three principal models of respiratory disease-specific questionnaires currently in use are the Saint George's Respiratory Questionnaire (SGRQ)[6] and the Airways Questionnaire 20 (AQ20),[7] both of which have already been validated for use in Brazil.[8-10] The third is the Chronic Respiratory Questionnaire (CRQ).[11]

The CRQ has been widely used in the analysis of the health status of patients with COPD. The CRQ has been translated and validated for use in the Netherlands,[12] in Spain[13] and in three German-speaking countries (Switzerland, Germany and Austria).[14] It has proven to be useful in a variety of interventions in COPD, including pharmacological interventions[15] and rehabilitation.[14,16] In addition, among the instruments that specifically assess the quality of life of patients with COPD, the CRQ has proven to be superior to the SGRQ because it is more responsive to interventions, such as pulmonary rehabilitation programs.[17,18] Although the CRQ is widely used to assess the quality of life of patients with COPD,[19] no Portuguese-language version of this questionnaire has been validated for use in Brazil.

In order to measure the health status of patients whose language and culture are different from those for which the questionnaire was developed, it is recommended that the instrument be validated.[20,21] Therefore, it is necessary to adapt the questionnaire to the cultural context of the population studied, since the perception of time, the meaning attributed to the symptoms and the course of a given disease can vary from culture to culture.[22] In addition, if studies using translated questionnaires are to achieve international acceptance, they must employ questionnaires validated for use in the target language.[23]

Therefore, the objective of the present study was to determine whether the Portuguese-language version of the CRQ, which is a respiratory disease-specific quality-of-life questionnaire, is a valid and reproducible instrument for measuring the quality of life of Brazilian patients with COPD.

Methods

Fifty individuals with COPD were included in the present study. Of those, 28 were recruited from the Pulmonary Rehabilitation Program of the *Hospital Universitário Regional Norte do Paraná, Universidade Estadual de Londrina* (HURNPR/UEL, Northern Paraná University Hospital/Londrina State University), located in the state of Paraná, Brazil, and 22 were recruited from the Pulmonary Rehabilitation Program of the Center for Physical Therapy and Rehabilitation Studies and Treatment of the São Paulo State University, Presidente Prudente Campus, located in the state of São Paulo, Brazil.

All patients had been clinically diagnosed with COPD according to the criteria established by the Global Initiative for Chronic Obstructive Lung Disease (GOLD).[1] In addition, patients should be clinically stable (free of exacerbations or infections in the last 3 months) in order to be included in the study. The exclusion criteria were as follows: presenting other diseases (pulmonary or otherwise) considered severe or disabling; failing to appear for the scheduled appointments; presenting acute exacerbations during the evaluation period; being unable to understand the questionnaires or other tests; and being uncooperative.

The study was approved by the HURNPR/UEL Research Ethics Committee (ruling no. 064/06). After the selected patients had been advised of the study procedures and objectives, all gave written informed consent.

In order to determine the reproducibility of the CRQ, a Portuguese-language version of this questionnaire was administered to all participating patients. The questionnaire was applied on two occasions, one week apart, and was administered by the same interviewer on both occasions. The concurrent and criterion validity of the CRQ were evaluated based on the

correlation of the CRQ scores with the SGRQ scores—the SGRQ having already been validated for use in Brazil[9]—as well as on the correlation of the CRQ scores with the results of spirometry and the six-minute walk test (6MWT).

The CRQ, published by Guyatt et al.[11] in 1987, was the first instrument developed to measure the quality of life of patients with COPD and has been widely used in international studies.[19] This questionnaire can be administered by an interviewer (original version),[11] or it can be self-administered.[24] It consists of 20 questions grouped into four domains: dyspnea (5 questions); fatigue (4 questions); emotional function (7 questions); and mastery (4 questions). The dyspnea domain is individualized, that is, each patient selects, in a list of 26 items, the activities that caused dyspnea in the last two weeks. In addition, the patient can report activities that are do not appear on the list. Subsequently, from among the activities reported and selected, individuals choose five activities that they consider the most important and, using a seven-point scale, score their dyspnea for each of those activities. This scale ranges from 1 (maximum impairment) to 7 (no impairment). For the other domains (fatigue, emotional function and mastery), the questions are standardized and the patient responds to each question using the seven-point scale. A higher score translates to better quality of life. The results are expressed as mean scores, by domain. The minimum clinically important difference, which refers to the minimum amount of change that is significant for patients in their everyday life (improved or worsened quality of life) is 0.5 points.

In the present study, back-translation of the CRQ was not necessary, since McMaster University (Hamilton, Ontario, Canada), which is the holder of the copyright of the original English-language questionnaire,[11] officially granted us the rights to use a Portuguese-language version of the CRQ that was developed at McMaster University and had never been validated for use in Brazil or in any other Portuguese-speaking country. After this version had been read and carefully analyzed, it was applied, as an interviewer-administered instrument, to a small sample of patients with COPD in order to identify possible problems and difficulties related to the questions. Since there were no terms or situations that could not be applied to Brazilians, it was not necessary to make any changes to the questions in order to achieve cross-cultural equivalence. This made it possible to administer the questionnaire directly and immediately. Those interested in using the CRQ should request a copy of the questionnaire directly from McMaster University (contact: Ms. Peggy Austin: austinp@mcmaster.ca).

Table 1 - Characteristics of the sample of 50 COPD patients included in the study.

Variable	Result
Age, years	70 ± 8
Gender, M/F	32/18
Literate, Yes/No	41/9
BMI, kg/m^2	25 ± 5
$FEV_{1,}$ % of predicted	47 ± 18
FVC, % of predicted	71 ± 23
GOLD I/II/III/IV, n	3/22/17/8
6MWT, m	445 ± 64
6MWT, % of predicted	96 ± 14

BMI: body mass index; GOLD: Global Initiative for Chronic Obstructive Lung Disease; and 6MWT: six-minute walk test. Results expressed as number or as mean ± SD.

The SGRQ was developed by Jones et al.[6] to assess the quality of life of patients with COPD and was first validated for use in Brazil by Sousa et al.[8] This questionnaire addresses aspects regarding three domains: symptoms (24 items); activity (16 items); and (psychosocial) impact (36 items). Each domain has a maximum possible score (symptoms, 662.5 points; activity, 1,209.1 points; and impact, 2,117.8 points). The scores obtained for all of the questions in

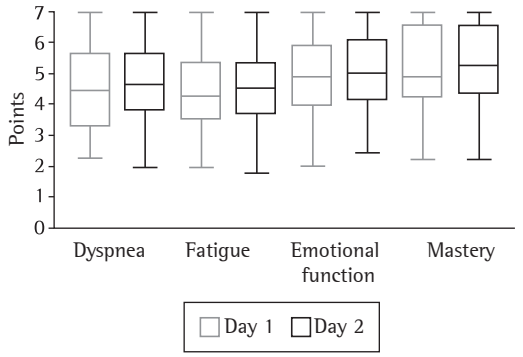

Figure 1 - Comparison of the Chronic Respiratory Questionnaire domains between day 1 (in gray) and day 2 (in black). Wilcoxon test: dyspnea, p = 0.12; fatigue, p = 0.09; emotional function, p = 0.10; and mastery, p = 0.49.

a given domain are summed, and the total is expressed as a percentage of the maximum for that domain (0-10%). In addition to the scores for each domain, a total score is calculated based on the results obtained for the three domains (0-3,989.4 points). A higher score translates to poorer quality of life.

Recently, in view of the difficulty of patients in understanding the double-negative sentences of the original version, a new version of this questionnaire was validated for use in Brazil by Camelier et al.[9] In this new version, the options "yes" and "no" have been replaced with "agree" and "disagree", in order to facilitate comprehension. Furthermore, the assessment interval was reduced from 12 months to 3 months. This new version, devised by Camelier et al.,[9] was used in the present study, and was administered by the same interviewer.

In addition to being interviewed in order to complete the questionnaires, the patients underwent spirometry, which was performed in accordance with the norms of the Pulmonary Function Test Guidelines established by the Brazilian Thoracic Association.[25] The patients enrolled in the HURNPR/UEL Rehabilitation Program were evaluated using a Pony Graphics spirometer (Cosmed, Rome, Italy), whereas those recruited from the School of Science and Technology/São Paulo State University were evaluated using a Spirobank spirometer (MIR, Rome, Italy). The reference values adopted were those established by Pereira et al.[26]

The 6MWT was performed according to international standards,[27] in a 30-m corridor. Two tests were performed at least 30 min apart, and the highest value was used in the analysis. The reference values used were those established by Troosters et al.[28]

The statistical analysis was performed using the program GraphPad Prism 3.0 (GraphPad Software Inc., San Diego, CA, USA). Nonparametric statistical analysis was used because the data were ordinal. The CRQ test-retest reproducibility (test days designated day 1 and day 2, respectively) was determined using the intraclass correlation coefficient (ICC), as well as the Wilcoxon test. The concordance between day 1 and day 2 was

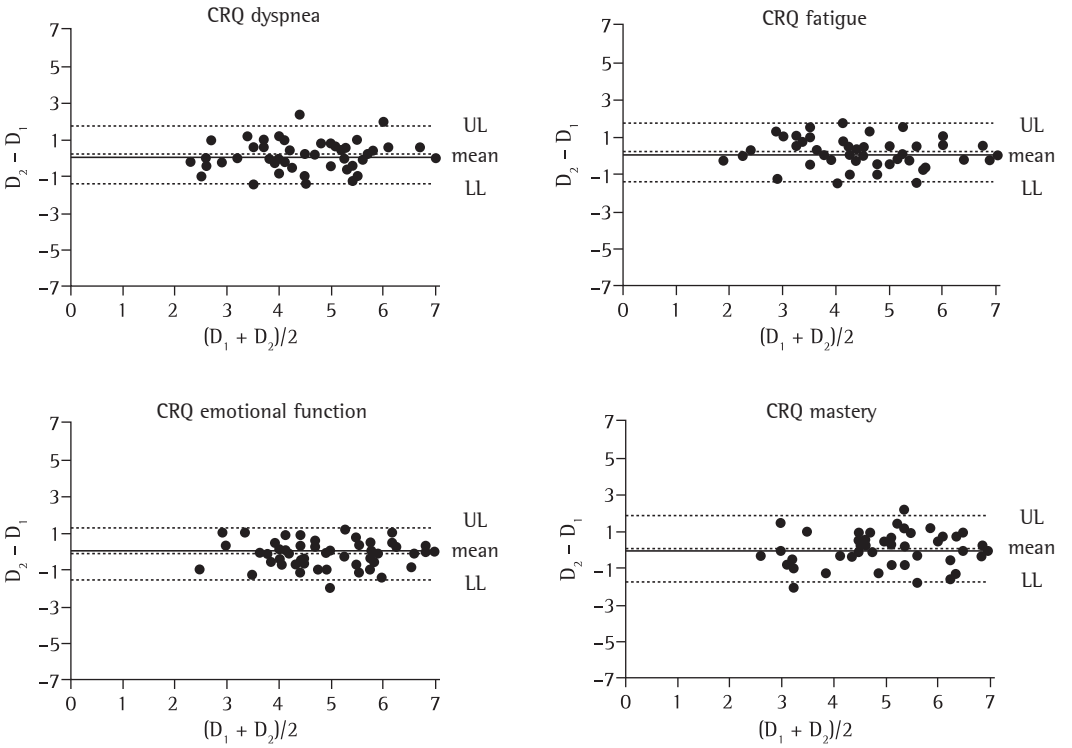

Figure 2 - Bland & Altman plots comparing the results obtained for the dyspnea, fatigue, emotional function and mastery domains of the Chronic Respiratory Questionnaire (CRQ) on test day (D_1) and on retest day (D_2). UL: upper limit; and LL: lower limit.

visually assessed using Bland & Altman plots. The internal consistency of the questionnaire was assessed using Cronbach's alpha coefficient. The validity of the CRQ in relation to the SGRQ, as well as the correlation of the CRQ with spirometric variables and with the six-minute walk distance, was determined using Spearman's correlation coefficient. The level of statistical significance was set at 5% ($p < 0.05$).

Results

Most of the 50 patients included in the study were classified as having GOLD stage II or III COPD (Table 1). There was a predominance of males (64%) and literate individuals (82%). None of the patients used home oxygen therapy, and 46 patients (92%) regularly used physician-prescribed bronchodilators. The clinical characteristics of the patients can be seen in Table 1. None of the patients were excluded from the study.

Regarding the CRQ test time, there was a statistically significant difference ($p < 0.0001$) between day 1 and day 2. The mean test time on days 1 and 2 was 20 ± 6 min and 17 ± 5 min, respectively.

Table 2 - Correlations (Spearman's correlation test) between the Saint George's Respiratory Questionnaire domains and the Chronic Respiratory Questionnaire domains.

SGRQ	CRQ	r	p
Symptoms	Dyspnea	−0.46	0.008
	Fatigue	−0.37	0.008
	Emotional function	−0.14	0.33
	Mastery	−0.30	0.03
Activity	Dyspnea	−0.67	< 0.0001
	Fatigue	−0.60	< 0.0001
	Emotional function	−0.44	0.0013
	Mastery	−0.52	< 0.0001
Impact	Dyspnea	−0.40	0.0035
	Fatigue	−0.50	0.0003
	Emotional function	−0.44	0.0016
	Mastery	−0.44	0.0013
Total	Dyspnea	−0.57	< 0.0001
	Fatigue	−0.56	< 0.0001
	Emotional function	−0.38	0.0060
	Mastery	−0.44	0.0014

SGRQ: Saint George's Respiratory Questionnaire; and CRQ: Chronic Respiratory Questionnaire.

In the comparison between day 1 and day 2, there were no significant differences in any of the domains of the questionnaire, as can be seen in Figure 1. For the four domains, the ICC between day 1 and day 2 was as follows: dyspnea, 0.98; fatigue, 0.97; emotional function, 0.98; and mastery, 0.95. Bland & Altman plots (Figure 2) showed good test-retest concordance for the CRQ. The Cronbach's alpha coefficient was 0.91 overall, whereas it was 0.86, 0.78, 0.81 and 0.70, respectively, for the dyspnea, fatigue, emotional function and mastery domains.

There were significant correlations between the CRQ domains and the SGRQ domains ($-0.30 < r < -0.67$; $p < 0.05$), with the exception of the CRQ emotional function domain in relation to the SGRQ symptoms domain ($r = -0.14$; $p = 0.33$), as can be seen in Table 2. There were no significant correlations between spirometric variables and the CRQ domains or between the CRQ domains and the 6MWT, with the exception of the fatigue domain ($r = 0.30$; $p = 0.04$).

Discussion

Since most quality-of-life questionnaires have been developed in English-speaking countries, a validation process is required before these questionnaires are used in other countries.[20,21] Therefore, for the questionnaire to be considered appropriate for scientific or clinical use, it is necessary to evaluate its reproducibility and its correlation with other instruments already validated with the same objective or, in certain cases, with traditionally used clinical parameters.[29] The results of the present study show that the Portuguese-language version of the CRQ is reproducible and valid for use in assessing the quality of life of Brazilian patients with COPD.

The absence of statistically significant test-retest differences, together with the high ICC values for the different CRQ domains, demonstrates the reproducibility of this instrument. For all of the CRQ domains, the ICC was above 0.95, the values being greater than those observed in studies involving validation of the CRQ for use in other countries.[11-13] The reproducibility of the questionnaire was also visually assessed using Bland & Altman plots (Figure 2), which demonstrated good concordance between day 1 and day 2.

Regarding the CRQ test time, there was a statistically significant difference between day 1

and day 2, the test time being shorter on day 2. We believe that this difference might be due not only to the fact that the patients had better comprehension of the sentences but also to the fact that, in the dyspnea domain, the number of activities reported by the patients on day 1 was different from that reported on day 2. For most patients, the number of activities that caused dyspnea reported on day 1 was greater than that reported on day 2. Since the patients had more activities from which they should choose only the five most important, more time was required. Despite this difference, the CRQ test time ranged from 12 to 26 min, which is in agreement with the findings of previous studies.[11,13,14]

In the present study, the validity of the Portuguese-language version of the CRQ for use in Brazil was shown by the significant correlation of its various domain scores with the domain scores and total score of the SGRQ, which is a traditional questionnaire and has already been validated for use in Brazil.[9] However, there was no significant correlation between the CRQ emotional function domain and the SGRQ symptoms domain. This might have occurred because the questions in the CRQ emotional function domain address aspects that are not directly associated with the aspects addressed by the questions in the SGRQ symptoms domain. Of the 7 questions in the emotional function domain, only 2 are related to emotional changes caused by the cough and dyspnea presented by the patient. Those 2 questions address the frequency with which patients have felt embarrassed because of their cough or labored breathing (question 9) and the frequency with which they have felt restless, tense or nervous (question 20) in the last two weeks.

In addition, none of the CRQ domains correlated with any of the spirometric variables. This finding is consistent with those of a previous study,[30] which demonstrated that the measurement of quality-of-life in patients with COPD might not be directly related to traditional physiological measures, since it reflects patient experiences and perspectives, regardless of the degree of respiratory muscle dysfunction. In the present study, this is corroborated by the limited correlation between the CRQ domains and the 6MWT. Another possible explanation for this limited correlation between the CRQ domains and the 6MWT is the fact that the patients in our sample (Table 1) presented relatively preserved exercise capacity in relation to that of patients participating in previous studies.[11,13,14]

When comparing the scores of each CRQ domain obtained for the Brazilian patients with those obtained for patients from other countries in which the CRQ was validated,[13,14] we observed that the scores found for the fatigue, emotional function and mastery domains in the present study (4.5 ± 1.2; 4.8 ± 1.0; and 5.1 ± 1.3, respectively) were similar to those found for the Spanish-language version (4.47 ± 1.20; 4.80 ± 1.26; and 5.0 ± 1.5, respectively) and those found for the German-language version, with the exception of the mastery domain (4.2 ± 1.2, 4.4 ± 1.0 and 4.4 ± 1.2, respectively). However, for the dyspnea domain, the score obtained for the Brazilian population was considerably higher (4.6 ± 1.3) than that obtained for the Spanish population (3.15 ± 1.00) and for the German-speaking population (3.17 ± 0.66), indicating a better quality of life for this domain. Although no formal statistical analysis has been performed to confirm such inferences, the > 0.5 point difference in each domain (the minimum clinically important difference for improved or worsened quality of life)[11] was considered the basis for drawing the inference that the values for the groups of Brazilian patients, German-speaking patients and Spanish patients were similar (with the exception of the CRQ dyspnea domain).

The difference found among the populations in terms of the dyspnea domain score might indicate culturally specific aspects related to the perception of dyspnea. The discrepancy in the scores of this domain might also be related to the relatively preserved exercise capacity of the Brazilian population (6MWT: 445 ± 64 m) in relation to that of the Spanish population (306 ± 56 m) and that of the German-speaking population (359 ± 111 m), as well as to other differences among the populations studied. Further studies addressing this issue might help clarify this discrepancy.

The lack of data regarding the responsiveness of the Portuguese-language version of the CRQ to interventions, such as pulmonary rehabilitation, can be considered a limitation of the present study. However, as previously mentioned, the CRQ (in its original version) is considered the most responsive of the instruments currently available.[17,18] Therefore, since

the Portuguese-language version proved to be equally valid and reproducible in relation to the original version, there is no reason to believe that the former would fail to present similar responsiveness, although this has yet to be objectively investigated.

In summary, the Portuguese-language version of the CRQ proved to be reproducible and valid for use in Brazilian patients with COPD. It is an important instrument for use by clinicians and researchers, increasing the options available to assess the quality of life of patients with COPD.

Acknowledgments

The authors would like to thank the physical therapist Nicoli Oldemberg Segretti for her contribution to the development of the present study.

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