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Reliability and Validity of the Malay Version Chronic Respiratory Questionnaire for used among COPD Patients

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ABSTRACT

Introduction: Chronic Respiratory Questionnaire (CRQ) is one of the disease-specific questionnaires to assess health related quality of life (HRQoL) among chronic obstructive pulmonary disease (COPD) patients. Objectives: This study investigate the validity and reliability of Malay version CRQ among COPD patients. Methods: The CRQ was administered twice to 46 patients with COPD (mean FEV1 44% predicted, FEV1/ IVC 37% predicted) from Medical Center of University Kebangsaan Malaysia (PPUKM).Test-retest reliability was assessed using intra-class correlation coefficients (ICC). Internal consistency was determined using Crohnbach's alpha coefficients ($\alpha = 0.7$). Spearman's correlation coefficient was done among the scores of CRQ, St George Respiratory Questionnaire (SGRQ) and six-minute walking test (6MWT) to examine the concurrent validity of the CRQ ($p<0.05$). Results: High internal consistency ($\alpha > 0.70$) was observed for 3 domains of CRQ with exception of dyspnoea domain ($\alpha = -0.631$). Test retest reliability demonstrated strong correlation (ICC >0.80). Concurrent validity of CRQ, showed significant correlations observed between domain of SGRQ's symptom, impact and total scores of SGRQ with CRQ's dyspnoea and emotional function ($-0.3< r < -0.4$; $p<0.05$). Significant correlation was observed between 6MWT and CRQ's fatigue domain ($r= 0.390$; $p=0.007$). Conclusions: The Malay version of CRQ is a reliable instrument for measuring health status of patients among chronic respiratory disease especially COPD. Items of fatigue, emotion, and mastery domain of the CRQ are reliable and valid and can be used to assess quality of life in patients with severe airways obstruction. Items of the dyspnoea dimension are less reliable and should not be included in the overall score of the CRQ in comparative research.

Keywords: Chronic obstructive pulmonary disease, St George Respiratory Questionnaire (SGRQ), Chronic Respiratory Questionnaire (CRQ), reliability , validity, Malay Version

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is a growing health concern in the general population including Malaysia.[1] It is characterized by chronic airflow obstruction which is not fully reversible and usually progressive.[2] Most COPD patients presents with dyspnoea, chronic cough, sputum production, anxiety, disability and many others.[2] The management of this condition focus on reducing their symptoms and improving their quality of life (QoL).[3]

Chronic Respiratory Questionnaire (CRQ) has been widely used to assess the quality of life of COPD patients in different countries. Apart from the original English version, CRQ are now available in various languages, including German,[4] Portuguese,[5] Arabic6 and Chinese.[7] It is valid and reliable instruments for measuring the health status of COPD patients. It has been widely used in assessing the effect of pulmonary rehabilitation programme (PRP)8 on the patients quality of life as well as reduced symptoms of fatigue and dyspnoea.[9] In Malaysia, the translated Malay and Chinese version of the St George Respiratory Questionnaire (SGRQ) have been used to assess the health-related quality of life (HRQoL) of COPD patients.[1,3] Therefore, it is the objective of this study to assess the validity and reliability of the constructed Malay version of Chronic Respiratory Questionnaire (CRQ) that was translated from the original English version of CRQ. Such study is relevant as it is only with good comprehension of the questionnaires can one appreciate how to answer the questionnaire appropriately.[7]

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MATERIALS AND METHODS

Patient population

Fifty-six individuals with COPD were recruited from University Kebangsaan Malaysia Medical Center (UKMMC). Inclusion criteria included all patients who was clinically diagnosed with COPD by respiratory physician ((1) FEV1 (forced expiratory volume in one second) < 60% predicted, and (2) FEVI/FVC (inspiratory vital capacity) < 50% both after two inhalations of 40µg ipratropium bromide), aged more than 35 years with stable COPD, able to carry out normal functional activities and isfluent in the Malay language. The exclusion criteria are patients with cognitive difficulties that was assess by mini-mental state examination (MMSE), poor comprehension of the Malay language and presents with co-morbidities that are disabling affecting their quality of life.

From the total 56 patients, 10 patients participated in a pilot test (comprehension test) of the Malay version of the questionnaire. The remaining 46 patients who participated in Pulmonary Rehabilitation Program at the University Kebangsaan Malaysia Medical Center (UKMMC) were recruited by convenience sampling. Ethical clearance was obtained from the Ethical Board of the university. Prior consent was obtained from all patients and they were informed that all data obtained will be kept confidential.

Chronic Respiratory Questionnaire

Chronic Respiratory Questionnaire (CRQ) consists of four domains: dyspnoea (5 questions), fatigue (4 questions), emotional function (7 questions) and mastery (4 questions). There were 20 questions scored on a 7-point Likert-type scale to express the degree of disability from 1 (maximum impairment) to 7 (no impairment) with the higher scores indicating better HRQoL while carrying out activities of daily living (e.g. gardening, washing and marketing). The dyspnoea domain was individualized in this study as the respondents needed to select activities in their daily life which are limited by shortness of breath from a list of 25 items or important activities of their daily life which are were not listed. Subsequently, they were requested to identify five important activities that will make them short of breath.

Translation and instrument development

The English self-administered CRQ (CRQ-SA) questionnaire in dyspnea domain were translated by a translator who is senior physiotherapists and familiar with handling of COPD patients into the Malay version. After a consensus meeting, the first Malay version CRQ-SA was translated. This was then pilot tested among 10 COPD patients to identify their difficulties in answering the questionnaire. Subsequently, the translation team, then discussed the comments made by these patients and modified accordingly. Back translation was done by an expert (a Linguist working in the Faculty of Health Science) from this modified Malay version CRQ- SA back into the English version. Finally, the final version of Malay CRQ-SA with individualized dyspnea domain was formed.

Instrument testing

To assess the internal consistency and concurrent validity of CRQ, 46 patients completed the self-administered Malay version Chronic Respiratory Questionnaire-(CRQ-SA), the Malay version St. George Respiratory Questionnaire (SGRQ) and performed a 6 minute walking test (6MWT).The Malay version SGRQ is also one of the disease-specific QOL questionnaires to assess the health related quality of life (HRQoL) of COPD patients. This questionnaire addresses aspects regarding three domains: symptoms (24 items); activity (16 items); and psychosocial impact (36 items) with higher score indicating poorer quality of life. In addition, the 6MWT was used to assess the functional exercise capacity of the COPD patients. All the outcome measures were assessed at the same time the CRQ- SA was administered. Test-retest reliability was done on all 46 COPD patients the second time following a 3 week interval by the same physiotherapist. During the second administration, all subjects were not aware of their previous scores.

Statisitcal analysis

The data were analyzed using SPSS for Windows version 20.0. Continuous variables were summarized by calculating the mean and standard deviation, whereas categorical variables were summarized by the number and percent. The scores of calculated CRQ domain were summed up from each item and then divided by the sum of total number of items in each domain. Since the data were not normally distributed, non parametric statistical analysis was used because the scores on the seven Likert-type scale were ordinal.5 Test-retest reliability was assessed using intra-class

correlation coefficients (ICC) for baseline and subsequent follow-up scores of CRQ domain. For internal consistency each domain was calculated using Crohnbach's alpha coefficients with a significance level set at $\alpha = 0.7$. Individualized dyspnoea domain was not included in this analysis because the patients selected different items such that the domain could not be assessed across the patients for internal consistency. In addition, Spearman's correlation coefficient was done among the scores of CRQ, SGRQ and 6MWT to examine the concurrent validity of the CRQ with significance level at $p<0.05$.

RESULTS

Forty six stable COPD patients were enrolled in the study. There were 17 (73%) males and 29 (63%) females. Malays made the majority of the patients (n=30, 65%) followed by Chinese (n=11, 24%) and Indians (n= 5, 11%). The mean age was 60.39 ± 13.09 years ranging between 35 to 85 years. In the past only 8 (17%) of them were hospitalised within the past 3 months unlike 37 (83%) of them. The subjects body weight varies between normal weight (44%, n=20), overweight (n=13, 28%), obese (n=11, 24%) and underweight (n=2, 4%). Smoking history presents with 52% (n=24) of them as non-smokers, 11% (n=5) were passive smokers, 13 % (n=6) were smokers and 24% (n=11) were ex-smoker, who quit smoking many years ago

Internal Consistency

All 46 patientswere included in the analysis for internal consistency. Cronbach's alpha coefficient was determined at 0.777 whilst for the other three domains of the CRQ Malay version ranged between 0.76 to 0.88 (Table 1). High internal consistency ($\alpha > 0.70$) were observed for the 3 domains of CRQ with the exception of individualized dyspnoea domain with $\alpha = -0.631$.

Table 1: Cronbach's alpha reliability coefficient of the Malay version Chronic Respiratory Questionnaire (CRQ)

Domains	Cronbach's Alpha	Mean
Individualized Dyspnoea	-0.631	-
Fatigue	0.843	4.402
Emotional Function	0.880	5.040
Mastery	0.760	5.082
Overall	0.777	6.336

Test- Retest Reliability

Forty-three patients completed the test-retest reliability testing. Three of them dropped out before the second test. Most of them who participated were females (60.5 %) with mean age of 60.51 years (SD± 12.485). Findings demonstrated strong correlation for the CRQ and all 4 domains with ICC >0.80 (Table 2).

Table 2: Test-retest reliability of the four domains of Chronic Respiratory Questionnaire (CRQ) Malay version

Domains	ICC	1st score (SD)	2nd score (SD)	Mean △
Dyspnoea	0.971*	4.35 (1.098)	4.61 (1.006)	0.26
Fatigue	0.895*	4.37 (1.160)	4.55 (0.927)	0.19
Emotional Function	0.965*	4.98 (1.156)	5.03 (0.945)	0.05
Mastery	0.969*	5.05 (1.162)	5.04 (1.021)	-0.01

*$p<0.01$ SD = Standard Deviation; △ = Change in mean score

Concurrent Validity

The concurrent validity of CRQ, showed significant correlations observed between the SGRQ's symptom domain with CRQ's dyspnoea domain; SGRQ's impact domain with the CRQ's dyspnoea domain; Total scores of SGRQ with CRQ's dyspnoea and emotional function domain ($-0.3 < r < -0.4$; $p<0.05$). No significant correlations ($p > 0.05$) were observed in CRQ domains and other SGRQ domains (Table 3).Significant correlation was observed only between 6MWT and CRQ's fatigue domain ($r= 0.390$; $p=0.007$) as observed in Table 4.

Table 3: Correlation (Spearman's correlation test) between domains of CRQ Malay version and SGRQ Malay version and 6MWT

SGRQ	CRQ	R	P
Symptom	Dyspnoea	-0.371	0.011*
	Fatigue	-0.181	0.228
	Emotional Function	-0.173	0.251
	Mastery	-0.213	0.155
Activity	Dyspnoea	-0.150	0.320
	Fatigue	-0.167	0.267
	Emotional Function	-0.123	0.416
	Mastery	-0.148	0.328
Impact	Dyspnoea	-0.310	0.036*
	Fatigue	-0.184	0.220
	Emotional Function	-0.325	0.027*
	Mastery	-0.254	0.088
Total scores	Dyspnoea	-0.367	0.012*
	Fatigue	-0.271	0.069
	Emotional Function	-0.334	0.023*
	Mastery	-0.279	0.060

*significant $p<0.05$

Table 4: Correlation (Spearman's correlation test) between domains of CRQ Malay version and 6MWT

6MWT	CRQ	R	P
	Dyspnoea	0.176	0.241
	Fatigue	0.390	0.007*
	Emotional Function	0.104	0.490
	Mastery	0.142	0.346

DISCUSSION

Health related quality of life (HRQoL) instruments are useful for monitoring the quality of life of patients' progress.[6] It provided an impression of the patient's previous perception of their symptoms following evaluation of a health care provider.[6] Having the CRQ translated in the Malay language would provide a mechanism of effective evaluation following comprehension of their mother tongue language among the Malay speaking COPD patients. Excellent internal consistency (stability across the items of a same domain) for the new Malay CRQ version was observed (>0.75) except for the individualized dyspnea domain. These findings except for the individualized dyspnea domain were similar to other studies who attempts translation of the English version CRQ into its different language.[5, 10-12]

In addition, previous study have demonstrated high internal consistency of the CRQ with alpha coefficients ranging between 0.84 to 0.87 for the individualised dyspnoea scale.[12] The low internal consistency for the individualized dyspnea domain of the Malay CRQ version may be due to the fact that the dyspnea domain was individualized specifically for COPD patients unlike domains of fatigue, emotional function and mastery that are standardized. Internal consistency of dyspnoea domain was reported at $\alpha = 0.51$ in the first administration followed by $\alpha = 0.53$ for second administration, indicating low internal consistency.[12] The dyspnoea domain, however was less reliable and not discriminative among patients with lesser or greater dyspnoea as it was an individualized domain.[13]

Compared to our findings from the previous literature, higher test-retest reliability (stability over time) for each domain of the new CRQ Malay version (ranging from 0.81- 0.95) was observed.[10] To ensure that the patients were under stable condition, all the precautions were taken before taking the second measurement within the 3 weeks interval. Other studies also showed high test-retest reliability for CRQ in the various version with r > than 0.7.[4, 7, 14] The authors of CRQ had established that the test- retest reliability of the tool was high[15] before its release. Harper et al (1997) also examined the CRQ measurements in clinically stable patients over time. His findings demonstrated higher test-retest reliability between the initial assessment and the first interval of six months (follow up) for each domain of the CRQ.15 Reliability over the first interval of six months was also evaluated with other instruments, showing no evidence of bias between administration.[15]

Our findings demonstrated that the domains of fatigue, emotional function and mastery produced high test-retest reliability (p above 0.90) whereas the dyspnoea domain showed a moderate test-retest reliability of p=0.73.[16] William et al (2001) examined both the short term and long term test-retest reliability of the CRQ-SA (self-administered). There were no statistically or clinically significant differences in the short term and after the longer period of 7 weeks.[17] Test-retest reliability was found to be high in each domain, both in the short and longer term.[17]

In order to measure the health status of the patients, it is essential that these questionnaires are valid and reliable. Validity refers to an instrument's ability to measure what it claims to measure.[18] Evidence had shown that the CRQ is a valid instrument to evaluate the health related quality of life for patients who had chronic respiratory disease.[15] Despite documented correlation of CRQ with other outcome measures such as SF-36 and SGRQ which were statistically significant ($p < 0.05$), our finding did not show such correlation.[5 12] There were only significant correlations between SGRQ's symptom domain with CRQ's dyspnoea domain; SGRQ's impact domain with CRQ's dyspnoea domain; total scores of SGRQ with CRQ's dyspnoea and emotional function domain ($-0.3 < r < -0.4$; $p<0.05$). This may be due to the fact that the subjects may still perceived differently or have some misunderstandings over the domains in CRQ Malay version. Some modifications may be necessary for future validation of the CRQ Malay version need to be carried out in the future.

In addition, similar to other studies[5, 7, 10] there were no significant correlations between CRQ domains and the 6MWT, with the exception of the fatigue domain. Thismay be due to the physical aspects of the patients which partially represents the QOL of the COPD patients whilst the emotional aspects can only be assessed subjectively through the QOL scores.[7] Moreover, the author of the CRQ has shown that the changes in the CRQ were correlated with the changes in spirometric values, exercise capacity, as well as patients' and physicians' global ratings.[19] The CRQ has been proven valid and can serve as a QOL instrument for clinical trials.[19]

This study is not without its limitation. The small sample size (only 46 subjects) for the reliability and validity testing may not be appropriate. The limited duration of carrying out this study was a limitation to recruit a larger number of COPD patients. Suggestion for a larger sample size or population from various multicentre trials can improve generalizability of this tool. The inclusion criteiria involves COPD with wide range (35 to 85 years old) which may influence the QOL of the COPD patients and severity of the condition. Comments by some of the patients that the CRQ–SA questionnaire 7 point scaleis too long and confusing to answer. Further studies on modifying the CRQ-SA with 5 or less point scale can be done to simplyfy the questionnaire which can make it easier for patients to answer. The strength of the this study is the development of such questionnaire would provide convenience among local population to comprehend the questionnaire easily so that their main problems can be identified, Despite the small sampling size, the subjects were appropriate and represent the true characteristics of COPD patients in local setting.

CONCLUSIONS AND RECOMMENDATIONS

The Malay translated version of Chronic Respiratory Questionnaire that is self- administered with individualized dyspnoea domain is a valid and reliable tool. It is highly acceptable and easily administered to the patients. It has high internal consistency and test-retest reliability. Having the CRQ-SA questionnaire in the Malay language would allowed this questionnaire to be used widely among the Malay speaking countries like Brunei, Indonesia and Singapore. However, further studies need to be carried out to determine the low correlation between changes of CRQ scores and other outcome measures.

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