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Validation of the COPD Assessment Test in Patients with COPD in Iran

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Abstract

Background: Chronic obstructive pulmonary diseases (COPD) is among the most important causes of chronic disease in adulthood. COPD assessment test (CAT) and Saint George Respiratory Questionnaire (SGRQ) are two health related quality of life questioners validated for application in patients with COPD. Our purpose was to evaluate the validity and reliability of the short and easily translated CAT questionnaire for COPD patients.

Material and Methods: Between December 2015 and November 2016, in a cross-sectional pilot study, COPD patients attending Masih daneshvari hospital were asked to complete the Farsi translation of the CAT questionnaire. The inclusion criteria were patient consent, having stable COPD, ability to respond to questions and lack of other pulmonary disease. The results of the questionnaire were compared with the SGRQ and frequency of visits to the emergency room. The Cronbach's alpha coefficient was calculated for the questionnaire.

Result: 77 patients participated in this study with mean age of 63 ± 12 years (27-88). Sixty six subjects (85.7%) were male and eleven (14.3%) were female. Mean CAT score was $24/87 \pm 7$ (range 1-40). The Cronbach's alpha coefficient for the CAT questionnaire was calculated to be 0.732. The correlation between CAT and SGRQ was significant ($r=0.666$, $P=0.000$). Correlation between CAT score and frequency of emergency visits and subjects' being married were ($r=0.627$, $P=0.017$) and ($r=0.58$, $P=0.024$) respectively.

Conclusion: CAT questionnaire is well accepted by patients as is correlated well with SGRQ and patients' psychometric status. Trial registration number: IRCT2016102927929N3.

Keywords: Chronic obstructive pulmonary diseases; COPD assessment test; Validity; Reliability

Introduction

COPD is one of the most important causes of chronic diseases in adulthood [1] and a significant reason for disability and death

in patients with moderate or severe airways obstruction [2]. Alongside some tests such as the spirometry and physical activity, influence of COPD on quality of life is measured via a number of questionnaires. The questionnaires have been developed to both assess severity of the disease at a point in time and evaluate effectiveness of treatments. In addition, although the degree of airway obstruction is a good measure for severity of COPD, it does not reflect and evaluate the effect of illness on the quality of life as well as does not have good correlation with the perception of disease symptoms in patients [1].

Qualitative studies on COPD patients, which consider the effects of their illness, are measured via frequency and severity of symptoms as well as physical and emotional wellbeing [3]. Hence, several questionnaires have been developed to evaluate effects of the illness on life. Well known questionnaires with acceptable validity and reliability include the CCQ (COPD Clinical Questionnaire), SGRQ (Saint George Respiratory Questionnaire), the CRQ (Chronic Respiratory Disease Questionnaire) and CAT (COPD Assessment Test) questionnaires. CCQ, SGRQ and CRQ are longer than CAT and have more involved scoring methods [4,5].

Quality of life questionnaires can be disease specific or generic to apply for any illness. A well-known example of the generic questionnaires is SF-36 (short form). SF-36 is used to evaluate quality of life in patients with chronic pulmonary disease such as COPD and assess the effectiveness of treatments [6]. SF-36 is a self-reported questionnaire and has been translated in many languages.

Overall, the impression of patients and their physician has been utilized to develop of a questionnaire [7]. It is also shown that literacy is important for being able to respond to quality of life questionnaires [8]. Some qualities such as comprehensiveness, shortness, cultural adaptability and expression in simple language are significant for selection of a questionnaire. Recently, the CAT questionnaire has been developed based on working with patients and for becoming familiar with their problems in their own language [9]. In some studies, in order to evaluate clinically outcome measures of patients having COPD, CAT questionnaire was compared with

the HRQL (Health Related Quality of Life) as well as the CRQ questionnaires, separately [10,11].

The aim of this study was validation of a short and easily translated CAT questionnaire in patients with COPD in Masih daneshvari hospital, Tehran, Iran. The results of this study may be used to evaluate quality of life as well as effectiveness of treatment modalities such as rehabilitation in the future.

Materials and Methods

The current research was a cross-sectional pilot study. Persian translation of the CAT questionnaire was completed by COPD patients attending Masih Daneshvari Hospital during the time period between December 2015 and November 2016. The diagnosis of COPD was confirmed by using the patients' medical history, physical examination and irreversible PFT obstructive pattern. All patients attending either the emergency department or general medical ward who met the inclusion criteria were entered into the study. A series of the patients were on optimal therapy and some patients were any outpatients. The inclusion criteria included patient consent, having stable COPD, ability to respond to questions and lack of other pulmonary disease. For patients who were illiterate, the questionnaire was read by interviewers.

The CAT questionnaire has been developed to evaluate quality of life and effect of illness on patients with COPD in their own language. It has eight questions and is short. Each question has a possible score of 0-5 with a questionnaire total score of 40. This questionnaire had been translated by the Breslin method to the Farsi language (questions were translated, reverse translated, and have been culturally adapted by specialists in the field). The SGRQ is specific for chronic pulmonary disease patients and is self-reported by the patients. It takes close to 10 minutes to complete the questionnaire. It has 50 questions in three subsections: symptoms, activities and impact. The questions have 0-100 points and are expressed in percentages. The higher the score, the worse the quality of life is. The SGRQ has been translated to the Persian language and has acceptable validity and reliability [7].

In this study, the result of CAT questionnaire was compared with the SGRQ as well as the frequency of visits to the emergency room, separately. The mentioned information and patient's demographic data were saved and analyzed using SPSS 16 statistical software.

The Cronbach's alpha coefficient was calculated for the questionnaire. The Chi-square test was used for evaluating relatedness of questionnaire results with other tests such as other measures of severity of illness and influence of demographic characteristics.

Results

In total, 77 patients participated in this study with mean age of 63 ± 12 years (27-88). Sixty six subjects (85.7%) were male and 11 subjects (14.3%) were female. Patient's information is summarized in **Table 1**. Mean CAT score was 24.87 ± 7 (range 1-40). The Cronbach's alpha coefficient was calculated to be 0.732 for the CAT questionnaire. There was statistically

significant correlation between the scores from the CAT questionnaire and the total scores from the SGRQ ($r=0.666$, $P=0.000$).

Table 1: Patient information.

Characteristic	Value and Percentages
Age	63 ± 12 years (27-88)
Gender	
Male	66(85/7%)
Female	11(14/3%)
Education	
Illiterate	25(32%)
Primary school	33(43%)
Junior High	5(7%)
High school	9(11%)
University	5(7%)
Occupation	
Laborer	11(15%)
Homemaker	9(11%)
Self-employed	40(52%)
Retired	11(15%)
Doctor	3(4%)
Unemployed	3(4%)
Marital status	
Single	74(96%)
Married	3(4%)
Smoking	
No	62 (80%)
Yes	15(20%)
Use of opium	
No	49(63%)
Yes	28(37%)

Regression analysis showed that there is statistically significant correlation between frequency of visit to the emergency room with the CAT questionnaire score. Correlation between the score of the CAT questionnaire and frequency of emergency visits in the past three months had a standard coefficient of 0.627 with $P=0.017$. Regression analysis also showed that there is statistically significant correlation between

marital status with the CAT questionnaire score. Correlation between the score of the CAT questionnaire and being married had a standard coefficient of 0.580 with $P=0.024$. The correlation between CAT score and SGRQ, CAT score and frequency of emergency visit as well as CAT score and marital status is summarized in **Table 2**.

Table 2: Correlation between CAT questionnaire and SGRQ, frequency of emergency visit and marital status.

Value	SGRQ	Frequency of emergency visits	Marital status
CAT (P-value)	0.000**	0.017*	0.024*
CAT (r)	0.666	0.627	0.58

Discussion

In order to evaluate the quality of life and achieve a better relation between the COPD patients and physician, Jones et al. developed SGRQ. The questionnaire was developed using patients descriptions of the effects of the illness symptoms on their overall health status. The questionnaire's translation in various countries has been very easy [12,13]. In Europe and the United States, a version of this questionnaire containing 21 question has been used in large studies ($n=1503$) [14]. The Cronbach's alpha coefficient for internal reliability has been 0.88. The questionnaires repeatability has also been very good with intra class correlation coefficient of 0.8.

However to select a questionnaire, some items such as comprehensiveness, shortness, cultural adaptability and expression in simple language are important [9]. In this pilot study, a short and easily translated CAT questionnaire was validated in COPD patients in Iran. The Cronbach's alpha coefficient for the CAT questionnaire was 0.732. The Cronbach's alpha coefficient was employed to check the internal reliability of the questionnaire. Results of the Regression analysis showed that there was statistically significant correlation between the CAT score and the total SGRQ score. There was also statistically significant correlation between frequency of emergency visits and CAT score. Furthermore, there was statistically significant correlation between being married and CAT score.

In a study in the United States ($n=53$), correlation coefficient of an eight question version of CAT with the SGRQ was found to be $r=0.8$ [14]. The score difference for patients in the controlled state and during exacerbation has been five points out of the total of 40 (12%, $P<0.0001$). In a review study, quality of life questionnaires for COPD patients were evaluated and symptoms such as pain, interest in life and emotional activities were addressed in disease specific questionnaires [15]. In eight studies that were done in private offices, the CAT questionnaire was evaluated with participation of pulmonary rehabilitation patients. Results of these studies indicated that there is strong evidence for the questionnaires' content validity, internal consistency and correlation with similar instruments. In another study in Netherlands, the CAT, CCQ and SGRQ were completed by 90 COPD patients in stage I-IV during three visits and

compared with each other [16]. This study showed that the CAT and CCQ both had acceptable validity, reliability and repeatability. The Chronbach's alpha coefficients for the CAT and CCQ were 0.86 and 0.89, respectively. Scores from two questionnaires had good correlation with each other. Comparing CCQ and CAT questionnaires, 61.1% of the patients believed that the CCQ expresses their situation better and contains more details about their pulmonary problems which are more important to them than sleep and energy levels.

As far as we know, a short and easily translated CAT questionnaire was validated in COPD patients in Iran for the first time in this study. The CAT questionnaire has been translated to other languages including Japanese where it has had a Chroncach's alpha coefficient of 0.891 and shown high correlation with scores from the SGRQ [17]. This questionnaire was also translated to Chinese and Turkish and had acceptable report [18,19]. The CAT questionnaire has been used to follow the condition of patients with COPD, particularly for evaluating health improvement with rehabilitation and recovery from disease exacerbation [20-22]. Development of the CAT questionnaire to become familiar with patients problems in their own language has some advantages including its well acceptance by patients and correlation with SGRQ and patients' psychometric status [23].

Conclusion

In this pilot study, the CAT questionnaire was well accepted by patients and most questionnaires were fully completed. The Cronbach's alpha coefficient result showed that the CAT questionnaire had acceptable reliability. The validity of the questionnaire was supported by correlation with the scores from the SGRQ. This study was a pilot study performed with participation of patients at our hospital. A bigger study including patients in the controlled state and in different stages of the illness can be more comprehensive.

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