

VALIDITY OF CAT AND MMRC – DYSPNEA SCORE IN EVALUATION OF COPD SEVERITY

Nena Milačić¹, Bojan Milačić², Olivera Dunjić³, Maja Milojković³

Clinic of Internal Medicine, Department of Pulmonology, Clinical Center of Montenegro, Podgorica, Montenegro¹

Clinical Center of Montenegro, Center for Thoracic Surgery, Podgorica, Montenegro²

University of Niš, Faculty of Medicine, Institute of Pathophysiology, Serbia³

Chronic obstructive pulmonary disease (COPD) is one of the leading causes of morbidity and mortality worldwide. Although predominantly denoted as a pulmonary disease, COPD also presents with various extra-pulmonary effects which influence different aspects of patients' physical, emotional and mental well-being. Traditionally, evaluation of COPD severity is based on determination of pulmonary function and particularly on forced expiratory volume in 1 second (FEV1). However, numerous evidences show that FEV1 is not a parameter of sufficient strength when compared to the value of clinical symptoms, e.g. shortness of breath, cough, and COPD patients' quality of life (QoL). Besides, many clinical manifestations of COPD (anxiety, depression and decreased physical ability) are best expressed by patients themselves, and can be better determined by appropriate questionnaires. Some of currently recommended questionnaires used worldwide are CAT (COPD assessment test) and modified Medical Research Council (mMRC) dyspnea score, in combination with FEV1. Global initiative for COPD – GOLD with its current directives from 2013 includes CAT and mMRC parallel with a number of clinical exacerbations and FEV1 as the most valid parameters and based on that, introduces COPD classification into four groups – A,B,C and D, according to the severity of disease. Therefore, we consider that a full insight into the patient's QoL and treatment efficacy are impossible without introduction of these self-evaluation questionnaires to the classical instrumental respiratory function evaluation in COPD patients. *Acta Medica Medianae* 2015;54(1): 66-70.

Key words: COPD, CAT score, mMRC-dyspnea scale, GOLD

Contact: Nena Milačić
Generala Pavla Jurišića Šturma 3/4, 18000 Niš, Serbia
e-mail:nenamilacic75@gmail.com

Introduction

COPD is a complex disease characterized by numerous symptoms, and it is a cause of significant health burden for both patients and healthcare system (1). COPD severity and treatment efficacy are traditionally evaluated by changes in FEV1 (2). Spirometry plays a central role in COPD diagnostics, although it does not accurately reflect the complete picture of health status in COPD patients (3). Namely, COPD patients have numerous symptoms – cough, sputum, dyspnea, chest tightness, and simultaneous existence of systemic inflammation which causes the extrapulmonary symptoms and signs of the disease, impossible to quantify with spirometry. These symptoms are far better

explained and interpreted through communication with COPD patients (4-6). Cough, shortness of breath and insomnia are frequently the major causes of impaired quality of life in COPD patients (6,7). A skeletal muscles dysfunction also significantly contributes to the reduction of patient's physical capacity, with a consecutive altered psychosomatic health status (8). For a detailed insight into the clinical treatment efficacy and disease severity, it would be crucial to accompany CAT and mMRC dyspnea score to the clinical investigation of COPD patients following the spirometry (1,9,10). In this way, it would be possible to track the individual experience without interference of medical professionals, although, at the same time, this would improve the communication between doctor and patient. Key words which describe COPD from patient's perspective are shortness of breath, fatigue, cough, expectoration (sputum), physical and social functioning, sleep quality and frequency of exacerbations (5,6,11), being the features of COPD which are most frequently reported in questionnaires completed by patients

(12). CAT questionnaire is very easy to interpret and understand if adequately adapted for patient's mother tongue, and all together, it consists of all necessary elements to create appropriate scoring system for physical and emotional evaluation of patient's health status. By all means, it should be emphasized that mMRC scale also enables patients to express their condition in an acceptable manner.

Modified Medical Counsel Research dyspnea test – mMRC

Shortness of breath is one of the most frequent symptoms reported by patients with long lasting COPD. The presence of dyspnea significantly reduces the quality of life, leads to inability and causes significant changes in lifestyle of COPD patients (13). It also causes insomnia and sleep disturbances, making patients feel mentally and physically exhausted (14). As a consequence, a major goal of COPD treatment is to diminish this symptom (15). Many tests used include dyspnea,

but Medical Research Council dyspnea scale (mMRC), a revised version of Medical Research Council test, is the most frequently used in clinical practice (16). It was introduced more than fifty years ago for patients with chronic bronchitis and it summarizes the score of five offered statements about breath possibility during the daily activities. Patients are offered to choose the one which describes their problems in the best manner. In that way, clinical investigators can get an impression of patients' perception and severity of disease. This test is very easy to perform; it is valid and correlates with clinical parameters and parameters of respiratory function (17).

Questionnaire for COPD evaluation – CAT

COPD Assessment Test-CAT questionnaire (Appendix 1) was developed in 2009, and based on American Food and Drugs Association questionnaire, according to model made on data collected

Your name:

Today's date:



How is your COPD? Take the COPD Assessment Test™ (CAT)

This questionnaire will help you and your healthcare professional measure the impact COPD (Chronic Obstructive Pulmonary Disease) is having on your wellbeing and daily life. Your answers, and test score, can be used by you and your healthcare professional to help improve the management of your COPD and get the greatest benefit from treatment.

For each item below, place a mark (X) in the box that best describes you currently. Be sure to only select one response for each question.

Example I am very happy (0) **X** (1) (2) (3) (4) (5) I am very sad

		SCORE
I never cough	(0) (1) (2) (3) (4) (5)	I cough all the time
I have no phlegm (mucus) in my chest at all	(0) (1) (2) (3) (4) (5)	My chest is completely full of phlegm (mucus)
My chest does not feel tight at all	(0) (1) (2) (3) (4) (5)	My chest feels very tight
When I walk up a hill or one flight of stairs I am not breathless	(0) (1) (2) (3) (4) (5)	When I walk up a hill or one flight of stairs I am very breathless
I am not limited doing any activities at home	(0) (1) (2) (3) (4) (5)	I am very limited doing activities at home
I am confident leaving my home despite my lung condition	(0) (1) (2) (3) (4) (5)	I am not at all confident leaving my home because of my lung condition
I sleep soundly	(0) (1) (2) (3) (4) (5)	I don't sleep soundly because of my lung condition
I have lots of energy	(0) (1) (2) (3) (4) (5)	I have no energy at all
		TOTAL SCORE

COPD Assessment Test and the CAT logo is a trade mark of the GlaxoSmithKline group of companies. © 2009 GlaxoSmithKline group of companies. All rights reserved. Last Updated: February 24, 2012

Appendix 1.: CAT score questionnaire

from more than 1500 patients with COPD. The aim of this was to determine the influence of COPD on health status and quality of life in COPD patients and improve the communication between doctors and COPD patients (18). This question-naire is actually a shortened and revised version of Sent George questionnaire, which has been utilized and created for clinical practice for more than 20 years, and proven a very good accuracy (19). Recently, SGRQ has been revised and transformed into its shortened version, yet keeping the validity and accuracy of previous version although with reduced number of questions (20). However, both SGRQ and SGRQ – specific test are very complex, and time-consuming. There was a need to develop a new questionnaire which would be short and simple for the clinical usage, and for CAT was proven to possess these qualities. CAT was shown to highly correlate to SGRQ-COPD specific test and moderately negatively correlate to FEV1 value (21,22).

CAT consists of eight items which cover a broad spectrum of COPD symptoms' influence on patient's quality of life. In spite of its shortness, it is a reliable determinant of COPD severity and can be routinely applied (22). Each item from the questionnaire is assigned 0-5 points which are given according to the symptom severity, with maximal CAT score of 40 points. These items are cough, sputum, dyspnea, chest tightness, capacity for exercise and activities, confidence, sleep quality and energy levels. CAT can be entirely adjusted to specific native language, easy to understand, short and clear. Its reliability has been already confirmed in several European countries – among others, Belgium, France, Germany, Netherlands, Spain and Great Britain, where investigations have been performed to establish the validity of the questionnaire. These investigations have suggested that CAT score was significantly lower in patients in stable phase of disease (17+8.3), compared to score in patients with exacerbation of COPD (21.3+8.4) ($p < 0.0001$). It was indicated that CAT score correlates with the COPD severity when COPD is staged according to GOLD criteria (I: 16.2+8.8; II: 16.3+7.9; III: 19.3+8.2 and IV: 22.3+8.7; I versus II, $p = 0.88$; II versus III $p < 0.0001$), and that CAT correlated to the SGRQ-C ($r = 0.8$, $p < 0.0001$). It is important to emphasize that CAT was also used for testing the treatment efficacy and was proven as useful, showing that CAT score was decreasing with good therapeutical response and stable phase of disease, if compared to the exacerbation phase, when it had higher values (23).

Conclusion

Chronic obstructive pulmonary disease (COPD) is multifactorial disease, characterized by various pulmonary and extrapulmonary manifestations which have significant influence on patients' quality of life (24). Pulmonary function is an essential component of COPD diagnostics, however not descriptive enough for understanding the patients' health status and quality of life (1-3). Therefore, new instruments are needed to evaluate these aspects of COPD, and mMRC and CAT score have proven to be very useful (6,7). Importance of COPD influence on physical, emotional and mental health is emphasized by new regulatory guidelines and criteria for clinical use of various questionnaires and interviews (25,26).

Questionnaires as SGRQ-C and CAT indeed offer a comprehensive evaluation of disease influence and have been sufficiently tested in various clinical populations and compared to clinical parameters. They respond to broad spectrum of therapeutical interventions and can give us insight into the treatment clinical efficacy (19,20). Development of CAT score is a result of continuous pursuit for a questionnaire which would be as simple and short as possible and applicable in clinical practice. It has a proven validity and it is a useful indicator of treatment efficacy in COPD patients (18).

Global Initiative of Lung Diseases in its directives recommends application of CAT score and mMRC-dyspnea score for evaluation of COPD patients (1). In concert with respiratory function parameters and number of exacerbations, they make the basis of COPD clinical classification into four groups - A,B,C and D (1). This indicates that traditional COPD severity evaluation based on pulmonary function parameters is not sufficient, and that FEV1 cannot be the only parameter. Patients' symptoms and history of disease must be also taken into account (5).

Good communication between patients and doctors is an essential constituent of good clinical practice, and this can be achieved also by application of the mentioned questionnaires, CAT and mMRC-dyspnea score. Their best advantages are efficient treatment of COPD, a mutual interest of patients and doctors. Therefore, introduction and application of these questionnaires should become a routine instrument of clinical evaluation of COPD patients in our country. COPD, as a significant economic burden even for highly developed countries, demands the best evaluation practice and efficient treatment, in order to achieve a benefit for patients but also for the health system of our country.

References

1. Global Initiative for Chronic Obstructive Lung Disease. Global strategy for the diagnosis, management, and prevention of chronic obstructive pulmonary disease 2013. Available from: <http://www.goldcopd>. Accessed November 20, 2013.
2. Jones PW, Agusti AG. Outcomes and markers in the assessment of chronic obstructive pulmonary disease. *Eur Respir J* 2006;27(4):822-832. [[CrossRef](#)][[PubMed](#)]
3. Jones PW. Health status measurement in chronic obstructive pulmonary disease. *Thorax* 2001; 56(11):880-887. [[CrossRef](#)][[PubMed](#)]
4. Agusti AG, Noguera A, Sauleda J, Sala E, Pons J, Busquets X. Systemic effects of chronic obstructive disease. *Eur Respir J* 2008; 31(2):416-468.
5. Andenaes R, Moum T, Kalfoss MH, Wahl AK. Changes in health status, psychological distress, and quality of life in COPD patients after hospitalization. *Qual Life Res* 2006;15(2):249-257. [[CrossRef](#)][[PubMed](#)]
6. Low G, Gutman G. Couples' ratings of chronic obstructive pulmonary disease patients' quality of life. *Clin Nurs Res* 2003;12(1):28-48. [[PubMed](#)]
7. Karachaliou F, Kostikas K, Pastaka C, Bagiatis V, Gourgoulianis KI. Prevalence of sleep-related symptoms in a primary care population-their relation to asthma and COPD. *Prim Care Respir J* 2007; 16(4):222-228. [[CrossRef](#)][[PubMed](#)]
8. Gosker HR, Wouters EF, van der Vusse GJ, Schols AM. Skeletal muscle dysfunction in chronic obstructive pulmonary disease and chronic heart failure: underlying mechanisms and therapy perspectives. *Am J Clin Nutr* 2000;71(5):1033-1047. [[PubMed](#)]
9. Jones PW, Harding G, Berry P, Wiklund I, Chen WH, Kline Leidy N. Development and first validation of the COPD Assessment Test. *Eur Respir J* 2009; 34(5):648-654. [[CrossRef](#)][[PubMed](#)]
10. Fletcher CM. Standardized questionnaire on respiratory symptoms: a statement prepared and approved by the MRC committee on the etiology of chronic bronchitis. *Br Med J* 1960;2:1665.
11. Evensen AE. Management of COPD exacerbations. *Am Fam Physician* 2010;81(5):607-613. [[PubMed](#)]
12. Testa MA, Simonson DC. Current concepts: assessments of quality of life outcomes. *N Engl J Med* 1996;334(13):835-840.
13. Ozalevli S, Ucan ES. The comparison of different dyspnea scales in patients with COPD. *J Eval Clin Pract* 2006;12(5):532-538. [[CrossRef](#)][[PubMed](#)]
14. Owens RL, Malhotra A. Sleep-disordered breathing and COPD: the overlap syndrome. *Respir Care* 2010;55(10):1333-1344. [[PubMed](#)]
15. Jones RC, Hyland ME, Hanney K, Erwin J. A qualitative study of compliance with medication in chronic obstructive pulmonary disease (COPD). *Prim Care Respir J* 2004;13(3):149-154. [[CrossRef](#)][[PubMed](#)]
16. Mahler DA, Waterman LA, Ward J, McCusker C, ZuWallack R, Baird JC. Validity and responsiveness of the self-administered computerized versions of the baseline and transition dyspnea indexes *Chest* 2007;132(4):1283-1290. [[CrossRef](#)][[PubMed](#)]
17. Camargo LA, Pereira CA. Dyspnea in COPD: beyond the modified Medical Research Council scale. *J Bras Pneumol* 2010; 36:571-578. [[PubMed](#)]
18. Dodd JW, Hogg L, Nolan J, et al. Properties of the COPD assessment test (CAT): response to pulmonary rehabilitation. A multicentre, prospective study. *Thorax*. 2011;66(1):425-429. [[CrossRef](#)][[PubMed](#)]
19. Meguro M, Barley EA, Spencer S, Jones PW. Development and validation of an improved COPD-specific version of the St George's Respiratory Questionnaire. *Chest* 2007; 132:456-463. [[CrossRef](#)][[PubMed](#)]
20. Liu R, Du YP, He B. Relationship between SGRQ score and pulmonary function and its influencing factors in patients with chronic obstructive pulmonary disease. *Natl Med J China* 2011;91: 1533-1537.
21. van der Molen T, Wilemse BW, Schokker S, ten Hacken NH, Postma DS, Juniper EF. Development, validity and responsiveness of the Clinical COPD Questionnaire. *Health Qual Life Outcomes* 2003;1:13. [[CrossRef](#)][[PubMed](#)]
22. Jones PW, Brusseau G, Dal Negro RW, et al. Properties of the COPD Assessment Test(CAT) in a cross-sectional European study. *Eur Respir J* 2011; 38(1): 29-35. [[CrossRef](#)][[PubMed](#)]
23. Leidy NK, Wilcox TK, Jones PW, Roberts L, Powers JH, Sethi S; EXACT-PRO Study Group. Standardizing measurement of chronic obstructive pulmonary disease exacerbations. *Am J Respir Crit Care Med* 2011;183(3):323-329. [[CrossRef](#)][[PubMed](#)]
24. Kinsman RA, Yaroush RA, Fernandez E, Dirks JF, Schocket M, Fukuhara J. Symptoms and experiences in chronic bronchitis and emphysema. *Chest* 1983; 83(5):755-761. [[CrossRef](#)]
25. Stucki A, Stucki G, Cieza A, Schuurmans MM, Kostanjsek N, Ruoff J. Content comparison of health-related quality of life instruments for COPD. *Respir Med* 2007;101(6):1113-1122. [[CrossRef](#)][[PubMed](#)]
26. Jones PW, Quirk FH, Baveystock CM. The St George's Respiratory Questionnaire. *Respir Med* 1991;85 Suppl B: 25-31.

VALIDNOST CAT SKORA I MMRC-DISPNEJA SKALE U PROCENI HRONIČNE OPSTRUKTIVNE BOLESTI PLUĆA

Nena Milačić¹, Bojan Milačić², Olivera Dunjić³, Maja Milojković³

Klinički Centar Crne Gore, Interna klinika, Odeljenje pulmologije, Podgorica, Crna Gora¹
Klinički Centar Crne Gore, Centar za grudnu hirurgiju, Podgorica, Crna Gora²
Univerzitet u Nišu, Medicinski fakultet, Institut za patofiziologiju, Srbija³

Hronična opstruktivna bolest pluća (HOBP) je jedan od vodećih uzroka morbiditeta i mortaliteta u svetu. Iako je pre svega shvaćena kao respiratorna bolest, HOBP ima i ekstrapulmonalne efekte koji utiču na mnoge aspekte fizičkog, emocionalnog i mentalnog stanja bolesnika. Tradicionalna procena težine HOBP-a oslanja se na merenje plućne funkcije i posebno forsiranog ekspiratornog volumena u prvoj sekundi (FEV1). Međutim, postoje brojni dokazi koji ukazuju da je FEV1 relativno slab pokazatelj u odnosu na simptome koje oseća bolesnik, koji su odraz uticaja HOBP-a na svakodnevni život. Prisutne posledice ove bolesti (anksioznost, depresija, poteškoće u obavljanju svakodневnih aktivnosti) najbolje mogu registrovati i opisati sami bolesnici kroz odgovarajuće upitnike. Najčešće korišćeni takvi upitnici u svetu su CAT skor i mMRC-dispnea skala, koji u kombinaciji sa vrednostima FEV1 znatno poboljšavaju uvid lekara u težinu HOBP-a, a samim tim i omogućavaju efikasniji tretman bolesnika. Globalna inicijativa za HOBP – GOLD, u svojim smernicama iz 2013. godine, uvrstila je CAT upitnik i mMRC-dispnea skalu, zajedno sa brojem egzacerbacija bolesti i FEV1, u validne parametre prilikom klasifikacije bolesnika na grupe A,B,C i D, na osnovu kojih možemo sveobuhvatno sagledati i proceniti HOBP. *Acta Medica Medianae* 2015; 54(1):66-70.

Ključne reči: HOBP, CAT upitnik, mMRC-dispnea skala, GOLD