Applicability of the chronic obstructive pulmonary disease assessment test as a measure of health status in patients with sequelae of pulmonary tuberculosis

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TO THE EDITOR,

Pulmonary tuberculosis often results in sequelae associated with airway obstruction and/or functional limitations, leading to lower tolerance to exercise and reductions in health status (HS) and, consequently, in quality of life (QoL), particularly in patients treated for more than six months.[1]

Considered as one of the leading causes of death worldwide, tuberculosis is estimated to have affected 10 million individuals in 2019, resulting in approximately 1.2 million deaths, despite the fact that the cumulative incidence of the disease fell by 9% between 2015 and 2019. Brazil was among the 30 countries with the highest number of cases of tuberculosis worldwide in 2019.[2]

Practical instruments for the measurement of HS and QoL are required in order to assess improvement.[3] The objective of this study was to investigate the applicability of the chronic obstructive pulmonary disease (COPD) assessment test (CAT) as an instrument to evaluate the HS of individuals with sequelae of pulmonary tuberculosis and limitations regarding exercise.

This was a cross-sectional, observational study. Patients with radiological evidence of sequelae of pulmonary tuberculosis who had completed treatment and consented to participate in the study were included. Meanwhile, individuals that were unwilling to cooperate, who had limited cognitive or intellectual ability, were clinically unstable, or that had any musculoskeletal lesion that could affect their physical capability, as well as patients with any comorbidity that could cause dyspnea, angina, or severe arrhythmias, were excluded from the study.

The evaluations included: analysis of medical records and interview; chest X-ray; physical examination (vital signs and anthropometry); mini-mental state examination (MMSE); the Modified Borg Scale (MBS), and physical fitness, assessed using the 6-minute walk test (6MWT) and maximum inspiratory and expiratory pressure (MIP and MEP, respectively). The Saint George Respiratory Questionnaire (SGRQ) and the CAT were used to evaluate the participants' HS.

All analyses were conducted using the Sigmastat software, version 3.1 (Systat Software, Inc., Point Richmond, California, USA). Differences and correlations were considered statistically significant when p-values were < 0.05.

The Institutional internal review board approved the study protocol under reference CAAE: 10481219.9.0000.5257. All participants signed an informed consent form.

This was a convenience sample obtained from the electronic database at the Thoracic Diseases Institute of Rio de Janeiro Federal University. A total of 46 individuals with sequelae of pulmonary tuberculosis who had been treated with the Brazilian Ministry of Health's standardized drug regimen were contacted. Among them, 16 were included in the study, eight of whom were women. The mean age of the individuals was 49.2 (± 15.2) years, and the mean body mass index was 23.7 (± 4.6) kg/m². Five of the participants were former smokers, with a mean smoking load of 34.8 pack-years. The mean MMSE score obtained was 26 (± 2.3), thus enabling the application of the instruments to evaluate HS and QoL.

The patients' complaints were mainly dyspnea (31.2%) and chest pain (18.7%). The most common X-ray findings were localized interstitial infiltrates (50%), low lung volume (31.2%), and nodular opacity (37.5%). Data collected at the time of physical examination, including hemodynamics, pulse oximetry, and perceived effort, as well as predicted measures and values related to physical fitness, cardiopulmonary response, respiratory muscle strength, and health status correlation, are shown in Table 1.

Upon physical evaluation, the participants' results regarding the 6MWT and MBS were normal, as well as their hemodynamic response.[4,5] Nevertheless, the strength of the respiratory muscles, determined by MIP and MEP, remained adequate, indicating a reduction in the participants' pulmonary vascular resistance and/or peripheral muscle force, with no negative effects on the respiratory muscles.[6,7]

The SGRQ is specific for respiratory diseases. The overall score serves to assess HS and QoL, while the questionnaire is subdivided into domains related to symptoms, activity limitation, and the social and emotional impacts of the disease. According to this instrument, QoL, whether overall or for an individual domain, is considered impaired when

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Table 1. Characteristics of the physical, functional, and health status of the participants.

Parameter	Mean and SD at baseline (% predicted)
SBP	133.8 ± 24.3
DBP	75.8 ± 12.4
SpO$_2$	96.8 ± 1.7
Heart Rate	82.1 ± 19.1
MBS	0.8 ± 1.1
6MWT	531 ± 101.1 (84.9)
MIP	100 ± 20 (97.4)
MEP	94.1 ± 23.4 (89.1)
SGRQ (total)	33.6 ± 26.1
Symptoms	38.3 ± 27.1
Activity Limitation	43.2 ± 27.7
Impact	29.3 ± 23.2
CAT	12.7 ± 8.4

SD: standard deviation; SBP: systolic blood pressure; DBP: diastolic blood pressure; SpO$_2$: oxygen saturation; MBS: Modified Borg Scale; 6MWT: 6-minute walk test; MIP: maximum inspiratory pressure; MEP: maximum expiratory pressure; SGRQ: Saint George Respiratory Questionnaire; CAT: Chronic obstructive pulmonary disease assessment test.

the value obtained is over 10%, while changes ≥ 4% following an intervention are indicative of a significant change in QoL.[8] The participants of the present study had a mean overall score of 33.6 (± 26.1) (symptoms 38.3 ± 27.1; activity limitation 43.2 ± 27.7; social and emotional impacts of the disease 29.3 ± 23.2).

Developed and validated in 2009, the CAT has the advantage of being a short, simple instrument to evaluate HS in patients with COPD in clinical practice.[4] The instrument consists of eight multiple-choice questions, with possible answers scoring from 0 to 5. The final score is reached by tallying the score for each question, with the impact of the disease being classified as follows: a) low: 6-10; b) medium: 11-20; c) high: 21-30; and d) very high: 31-40 points.[4] The CAT was previously used to evaluate HS in a cohort of individuals with a history of pulmonary tuberculosis associated with pulmonary hypertension.[9] Although the instrument had not yet been validated for use in that population, the mean score obtained was 14.76 ± 5.88; no statistically significant difference was found between the subgroups of smokers and non-smokers (p = 0.25). The score obtained in the present study was quite similar, with a mean overall score of 12.7 ± 8.4, thus indicating a medium impact on HS. The correlation of the CAT and the SGRQ scores was significant (p < 0.0001; r = 0.84).

The possibility of a preexisting pulmonary disease, particularly among individuals exposed to smoking, was a limitation of the present study since the functional differences among the participants were not evaluated according to the predominant pulmonary disorder (restrictive and/or obstructive). Nevertheless, patients could benefit from individualized cardiopulmonary rehabilitation irrespective of the type of disorder.[1,10]

Despite the limitation regarding the small sample size, it is reasonable to suggest that the CAT is as applicable as the SGRQ for the evaluation of HS in individuals with sequelae of pulmonary tuberculosis and exercise limitations. However, larger studies are needed in order to establish the usefulness of this highly practical instrument.

AUTHOR CONTRIBUTIONS

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