

ASSESSMENT OF COGNITIVE IMPAIRMENT IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE USING THE RAPID COGNITIVE SCREEN

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Abstract: *Objectives:* To determine the prevalence of cognitive impairment in chronic obstructive pulmonary disease (COPD) patients using the Rapid Cognitive Screen (RCS). *Design:* Cross sectional study. *Participants:* A total of 106 men and women with COPD 50 years of age or older. *Setting:* Pulmonary ambulatory clinic in a tertiary academic center in St. Louis, Missouri, USA. *Measurements:* We enrolled patients with COPD who completed the RCS tool. Patients were classified as having normal cognition, mild cognitive impairment (MCI), or dementia if they scored ≥ 8 , 6-7, or ≤ 5 , respectively. The prevalence of each category was measured, and patients' baseline characteristics were compared. *Results:* One hundred and six patients completed the RCS. Of those, 36 (33.9%) patients scored ≤ 5 on the RCS, 33 (31.1%) scored 6 or 7, and 37 (34.9%) scored ≥ 8 . The prevalence of dementia, MCI, and normal cognition were 33.9%, 31.1%, and 34.9%, respectively. Baseline lung function was not different between patients with normal cognition and those with abnormal cognition (FEV1 1.53 ± 0.39 vs 1.45 ± 0.32 L). In patients with abnormal cognition, there was no difference in patients' characteristics between patients with MCI or dementia. *Conclusion:* Cognitive impairment is highly prevalent in patients with COPD. RCS successfully identified cognitive impairment in COPD. We recommend performing RCS in patients with COPD routinely.

Key words: COPD, cognitive dysfunction, dementia, Rapid Cognitive Screen.

Introduction

Chronic obstructive pulmonary disease (COPD) has always been considered a disease mainly affecting the respiratory system, with its management focused on alleviating respiratory symptoms. Multiple comorbidities are commonly associated with COPD. (1) Cognitive decline is common in COPD patients with higher prevalence when compared to normal individuals with similar characteristics (2). Inhaler therapy is a cornerstone in the management of COPD; however, these inhalers require high degree of coordination to use with majority of patients using them incorrectly (3).

Addressing cognitive impairment in COPD patients can be challenging due to the complexity of the disease as healthcare providers usually focus on the respiratory aspects of COPD and overlooking other comorbidities including cognitive impairment. Our aim was to determine the prevalence of dementia and mild cognitive impairment (MCI) in COPD patients using the Rapid Cognitive Screen (RCS) (3, 4) in an ambulatory pulmonary clinic.

Methods

Participants

One hundred and six patients diagnosed with COPD were recruited from the Saint Louis University outpatient pulmonary clinic in St. Louis, Missouri. All patients > 50 years who had prior spirometry testing confirming airflow limitation and met the diagnosis criteria of COPD based on the Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2017_which

requires a post-bronchodilator FEV1/FVC of $< 70\%$ (5) were included. The study was approved by the Saint Louis University institutional review board. All study participants signed an informed consent form that was approved by the institutional review board.

Questionnaires

The RCS (Rapid Cognitive Screen) is an objective measure of cognition derived from the Saint Louis University Mental Status (SLUMS) examination. The research staff administered the RCS to the patients in clinic and scored the answers. Scores range from 0 being the lowest and 10 being the highest. Scores ≤ 5 are diagnostic of dementia, scores 6-7 are diagnostic of MCI and scores ≥ 8 are considered normal (4).

The COPD Assessment Test (CAT) is an 8-item questionnaire of health status and functional impairment in patients with COPD. (6) It is short and simple for patients to complete, and it assesses a broad range of COPD effects on patients. The CAT is widely used in the general medicine and pulmonary clinics. It ranges from 0-40; with higher scores suggest worse symptoms (7).

Data Analysis

We assessed baseline demographic, clinical, and lung function characteristics of study participants and continuous variables were reported as means \pm standard deviation and discrete variables were reported as prevalence. Patients were categorized into two groups, those with RCS score ≥ 8 were categorized as intact cognition and those with scores ≤ 7 were considered abnormal (MCI or dementia). T-test was performed

Table 1
Baseline demographics and patients characteristics

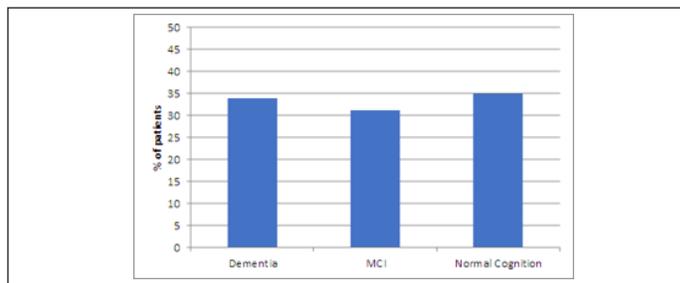
	Normal Cognition (N= 37)	Abnormal Cognition (MCI and dementia) N=69	p value
Demographic			
Age, y	64.8 ± 7.3	66.7 ± 9.3	0.27
Sex, male (%)	20 (54)	25 (36.2)	0.07
Current smoker (%)	15 (40.5)	20 (28.9)	0.22
Education, y	13.7 ± 1.6	12.2 ± 2.8	0.002
BMI kg/m ²	28 ± 6.2	26.7 ± 6.7	0.41
Advance directive (%)	20 (54)	27 (39.1)	0.14
COPD disease status			
FEV1, L	1.45 ± 0.56	1.53 ± 0.61	0.59
CAT	18.75 ± 8.2	20.0 ± 7.9	0.76
SaO ₂ (%)	95 ± 2.3	95.1 ± 3.4	0.84
PaO ₂ , mmHg	70.6 ± 9	65.8 ± 11.9	0.06
GOLD airflow severity:			
Severe/very severe	25 (67.5%)	39 (56.5%)	0.98

to compare continuous variables between the two groups and Chi square test was used to compare nominal variable. Data were analyzed using IBM SPSS Statistics, version 20.0 (Somers, NY)

Results

There were 106 patients who met inclusion criteria and agreed to participate and undergo the RCS. Baseline characteristics of patients with normal cognition and with dementia/MCI are compared in Table 1. Of the 106 patients, there was 36 (33.9%) patients scored ≤ 5 on the RCS, 33 (31.1%) scored 6 or 7, and 37 (34.9%) scored ≥ 8. The prevalence of dementia, MCI, and normal cognition were 33.9%, 31.1%, and 34.9%, respectively (figure 1). Patients with abnormal cognition were slightly older and more often female (not statistically significant). Baseline lung function was not different between patients with normal cognition and those with abnormal cognition (FEV1 1.53 ± 0.39 vs 1.45 ± 0.32 L). Neither smoking status nor baseline symptoms, as measured by CAT score, were associated with abnormal cognition. In the abnormal cognition group, there was no difference in patient's characteristics between patients with MCI compared to patients with dementia. Years of education were less in patients with abnormal cognition. Those with dementia tended to have lower BMI, however, this was not statistically significant (26.7 ± 6.7 vs 28 ± 6.2 kg/m², p= 0.41).

Figure 1
Frequencies of cognitive impairment in patients with COPD aged > 50 years



Discussion

COPD is a disease of the elderly. Although many patients present at a relatively young age, they share many features of aging such as frailty, osteoporosis, heart disease and sarcopenia. This can be due to the chronic inflammation associated with COPD.(8, 9) There is emphasis from major societies to address comorbidities in COPD including cognitive dysfunction.(10) Cognitive dysfunction deserves special attention in COPD patients as managing COPD requires significant patient involvement in education, inhaler technique proficiency, and early recognition of acute exacerbations.

Cognitive decline is common in COPD patients and it ranges between 10 to 61% depending on the assessment tool and definitions used (11, 12). Cognitive decline appears to be associated with worse outcomes in COPD such as poor quality of life, reduced survival and increased risk of COPD related hospitalizations independently of patients' variables (11, 13,

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14).

Inhaled medications are the mainstay in the management of COPD patients. However, their use requires a high degree of coordination, proficiency, and education and many COPD patients fail to use their inhalers correctly (15). In a study of inhaler adherence and level of cognition, the verbal memory performance was compared in four groups of patients (COPD, normal, normal elderly, and patients with Alzheimer's disease). The study showed that cognitive impairment was prevalent in COPD patients more than normal population of same age and that diminished recall may be associated with poor inhaler technique and adherence (16).

As the population is aging, COPD prevalence is increasing, and it is projected to be the third leading cause of death worldwide in 2030 (17). Cognitive dysfunction is likely to increase as COPD prevalence increases. Screening and assessing cognitive function in COPD patients can be difficult as these patients require assessment of other comorbidities. In this prospective study, we successfully assessed the utility of RCS tool in assessing cognitive function in patients with COPD. RCS has been validated in elderly patients and we aimed to utilize it for patients with COPD (4).

Screening for cognitive impairment is needed in all COPD patients as patients with impaired cognition require assistance in managing their disease. RCS serves as an excellent tool especially for the busy practitioner as it identifies MCI and dementia with high accuracy and reliability. RCS takes about 2-2.5 minutes to perform and can be administered by the office nurse, medical assistance, the physician or any other provider. It can be utilized in hospitalized patients for acute exacerbation of COPD prior to discharge where many COPD encounters occur.

Conclusion

Cognitive impairment is very prevalent in patients with COPD older than 50 years. The RCS is a rapid test of MCI and dementia that takes less than 2.5 minutes to conduct. RCS can identify impaired cognition in COPD reliably and it detected high level of cognitive impairment in older persons with COPD. RCS should be done at least once a year in all patient with COPD and be part of routine care of patients with COPD.

Conflict of interest: None

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