



## UTILITY OF COPD ASSESSMENT TEST IN THE EVALUATION OF COPD

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**ABSTRACT**

**AIMS AND OBJECTIVES:** To Assess the Utility of The COPD Assessment Test in the Evaluation of COPD

**Aim:** To study the utility of the COPD assessment test in the evaluation of COPD.

**Materials and Methods:** Prospective observational study, including a sample size of 330 patients of COPD satisfying the inclusion criteria. The CAT score of the patients was calculated based on the CAT questionnaire filled up by the patients. History of exacerbations, respiratory symptoms and FEV1 were correlated with the CAT score of the patient and statistical tests of significance were applied.

**Results:** The CAT score demonstrated a positive correlation with the severity of the disease, exacerbations and episodes of hospitalisations. The CAT score showed a negative correlation with the FEV1 of the patients and prognosis.

**Conclusion:** CAT score is an easy accessible point of care and comprehensive method to assess impact of disease in COPD. The utility of the CAT score can be broadened to judging the prognosis of the patients and to take measures to improve the same wherever possible. The CAT score not only demonstrates the quality of life of the patient but also the prospective trajectory of his symptoms and overall health.

**KEYWORDS :** COPD, CAT score, exacerbations**INTRODUCTION:**

COPD assessment test (CAT) is a patient filled questionnaire to assess the impact of the disease on the lives of the patient, especially the quality of life. It is a patient completed quality of life instrument that contains 8 questions which cover the impact of COPD symptoms[1]. COPD not only impacts the patient but also those around him by his or her dependence on them and loss of abilities he once possessed. This makes the assessment of impact of the disease in these patients invaluable and beneficial in terms of prognosis, deciding the further line of management and counselling to the patients and the relatives regarding the future implications of the disease.

CAT is interpreted as a score ranging from 0 to 40 depending upon the degree of severity of the disease. The results are easily available and there is no need for complicated calculations. This easy to interpret test correlates closely with health related quality of life as measured by the St. George's Respiratory Questionnaire (SGRQ) in patients with COPD[1].

The interpretation comprises of 4 categories based upon the score of the patient. A score of 0-10, 11-20, 21-30, 31-40 indicating mild, moderate, severe and very severe impact respectively. The quality of life is impaired by COPD exacerbations which are characterised by the worsening in the respiratory symptoms[2]. CAT score increase is associated with an increase in the severity of the disease[1,2].

**MATERIALS AND METHODS:**

A prospective observational study was carried out in our institute from the February 2018 to February 2019. 330 patients who were stable COPD patients were included in the study. These patients were registered patients in our institutes COPD registry and were following up with us routinely. These patients were subjected to CAT on their first visit to the OPD after commencement of the study. In patients who were unable to understand the standard English CAT questionnaire, vernacular CAT questionnaire was used. The patients along with a CAT were also subjected to a pulmonary function test on the same day.

A chest X-ray was performed on all patients to exclude other problems. The patients' respiratory symptoms, medications, smoking history, occupational exposure, exacerbation rates over the past 12 months, and coexisting medical conditions were documented at the beginning of the study. Co-morbid medical conditions were established using the clinical history and physical examination findings during the visit and were supported by available medical records.

Written informed consent was obtained from all patients, and the study was approved by the institutional ethical committee.

**Inclusion criteria:**

1. Minimum age of 40 years
2. History of smoking of 10 pack years or more or history of biomass fuel exposure.
3. FEV1 of less than 80% of predicted in the post test and a FEV1/FVC of 0.7 or less in the post test[3].

**Exclusion criteria:**

1. Patients with a primary diagnosis of asthma
2. Other active pulmonary disease in a patient
3. Other severe uncontrolled co-morbidities
4. Patients not willing to participate in the study

The condition of the patients was graded according to the stages of disease defined by the Global Initiative for Chronic Obstructive Lung Disease (GOLD)[4]. Currently, there is no universally agreed upon method to identify exacerbations. ATS and ERS define a COPD exacerbation as "an event in the natural course of the disease characterised by a change in the patient's baseline dyspnea, cough and/or sputum from day to day variability sufficient to warrant a change in management"[5]. This definition explains that an exacerbation can have various adverse effects on the patients symptoms and general health and can vary from patient to patient based upon the susceptibility of the patient to developing the said effects. Exacerbation definitions can be categorised into three groups: event-based, symptom-based and a combination of two. The definition utilised by us was the symptom-based definition which was first reported by Anthonisen et al.[6]. Anthonisen et al. defined exacerbation as increase in sputum purulence, increase in sputum volume and worsening of dyspnea. Patients who averaged  $\geq 2$  COPD exacerbations a year were classified as frequent exacerbators, whereas those who had  $\leq 1$  COPD exacerbations per year were defined as infrequent exacerbators.

The different averages were compared using Student's *t*-test for those that were parametric or the Mann-Whitney U-test for those that were non-parametric. ROC analysis was used to assess the ability of CAT to predict frequently exacerbator subgroup. A correlation coefficient was estimated for the relationship between the numeric variables. A 5% significance level was used as indicator of statistical significance. Ninety-five percent confidence intervals (CIs) were calculated. All tests were two-tailed, and statistical processing was carried out using

the Statistical Package for the Social Sciences (SPSS) version 12 for Windows

## RESULTS:

The study included 330 patients (mean age  $65.01 \pm 9.9$  years; 298 male (90.3%).

Patients with accompanying disease were also included in the study (diabetes mellitus ( $n = 18$ ), sleep disorders ( $n = 24$ ), depression ( $n = 14$ ) and lung cancer ( $n = 8$ )). The mean FEV<sub>1</sub> was 43.7% of the predicted value.

The mean CAT score completed by the patients was 21.2 ( $\pm 7.5$ ). Frequent exacerbators ( $n = 168$ ) had a mean CAT score of 24.8 ( $\pm 6.7$ ) compared to infrequent exacerbators ( $n = 162$ ) whose mean CAT score was 17.5 ( $\pm 6.5$ ). Thus, there was an average difference of 7.3 points in the CAT scores between the frequent and infrequent exacerbators ( $p < 0.0001$ ) (Figure 1).

There was a significant relation between the CAT scores and the percentage of the FEV<sub>1</sub> predicted value ( $p < 0.0001$ ). As the FEV<sub>1</sub> decreased, the CAT score increased. As the frequency of the COPD exacerbations increased, the CAT scores ( $p < 0.0001$ ) significantly increased. There was also statistically significant association between the exacerbation frequency and FEV<sub>1</sub> and thus severity of the disease ( $p = 0.017$ ). In the ROC analysis for assessing the ability of CAT to predict frequent exacerbator subgroup, the area under the curve (AUC) was 0.782 (95% CI 0.71–0.851), which is statistically significant ( $p < 0.001$ ).

The CAT score was directly proportional to the frequency of hospitalisations ( $p = 0.001$ ), and inversely proportional to the FEV<sub>1</sub> of the patients ( $p = 0.017$ ). Relation between the severity of the illness and the CAT score was also found to be statistically significant ( $p < 0.0001$ ) (Figure 2). In addition, there was a significant association between the severity of COPD and COPD exacerbations ( $p = 0.001$ ) as well as the severity of COPD and COPD exacerbations which required hospitalisation ( $p = 0.025$ ) over the past 12 months. Frequent exacerbators had more severe COPD ( $p = 0.035$ ), higher CAT scores ( $p < 0.0001$ ), and lower FEV<sub>1</sub> percentage of the predicted value ( $p < 0.0001$ ). The patients who had been hospitalised for an exacerbation had higher baseline CAT scores ( $p = 0.003$ ).

## DISCUSSION:

The study concluded that the CAT score is an effective tool in the evaluation of the severity of COPD patients and showed positive correlation with the disease severity. Also, CAT score also correlated well with the number of exacerbations experienced by the patients, proving its importance in the evaluation of future risk and prognosis for the patient. Moreover, the CAT score also showed a negative correlation with the FEV<sub>1</sub> in the study population.

In our study, the patients completed the CAT easily however illiterate patients needed help for completing the questionnaire.

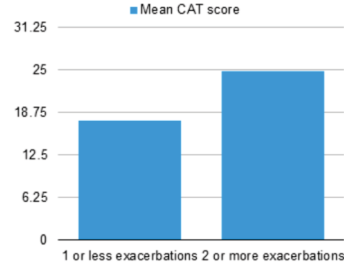
Mean age of patients included in the study was 65 (SD 9.9), the mean FEV<sub>1</sub> predicted was 43.7% and the mean CAT score was 21. We had 34% moderate, 42% severe and 21% very severe patients, totally 63% severe and very severe (Figure 2).

Previous studies have shown that the CAT is responsive to changes in COPD health status during recovery following a COPD exacerbation and in response to pulmonary rehabilitation[7]. CAT scores improved after pulmonary rehabilitation and they also indicated the degree of response[8].

Patients with more frequent exacerbations had a far worse quality of life and was also punctuated with hospitalisations and increased mortality[9-11]. The decreased FEV<sub>1</sub> of the COPD patients showed a positive correlation with frequent exacerbations. Exacerbations are generally increase in frequency as the severity of the underlying COPD increases, the most dependable predictor of exacerbations in an individual patient appears to be a history of exacerbations[12].

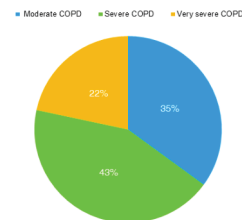
In the new GOLD guidelines, frequent exacerbators were defined as a different subgroup, independent from the FEV<sub>1</sub>. A recent study demonstrated that CAT score can not only be used to assess the severity of the illness, but also an indicator of prognosis with a fair idea of

impending or future exacerbations[13]. The baseline CAT scores in stable COPD patients showed positive correlation to exacerbation frequency. The study also demonstrated that in patients with severe COPD exacerbations requiring hospitalisation, the baseline CAT scores were elevated when they were examined against patients with COPD exacerbations who did not require hospitalisation.



**Figure 1: Mean CAT scores of the study sample categorised as frequent and infrequent exacerbators**

We could conclude from the study that the CAT provides a good estimate of the severity of COPD in the patients, is an easy point of care tool to assess the severity and impact of the disease. It also gives us a fair estimate of the predisposition of the individual to the development of exacerbations.



**Figure 2: Distribution of severity of disease of study sample based on FEV1.**

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