CLINICAL UTILITY OF CAT SCORE IN PATIENTS WITH COPD EXACERBATION AND STABLE DISEASE AND ITS CORRELATION WITH PULMONARY FUNCTION TESTS: AN OBSERVATIONAL PROSPECTIVE STUDY

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ARTICLE INFO	ABSTRACT	ORIGINAL RESEARCH ARTICLE

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Background: Burden of COPD is on rising and is a common cause of hospitalization and mortality. Presently Pulmonary Function Tests (PFT) is the common diagnostic tool as well as tool for assessing severity of COPD. However, PFT are not routinely available at Primary Health Centre. Present research aims to study clinical utility of CAT score for assessing COPD severity so that it can be used where PFT is unavailable. **Materials & Methods:** Aim of this study was to assess the correlation between CAT score and PFT parameters in stable COPD and its exacerbation. 50 patients from both form of the disease were included in the study. CAT score was noted & PFT was performed for stable COPD patients during their routine OPD visit and at day1 & day5 for those requiring hospitalization for COPD exacerbation. **Observations:** We found significant difference between each study group (Stable COPD patients, Day1 of COPD exacerbation and Day5 of COPD exacerbation) in all three parameters i.e. CAT score, FEV_1 (%pred) and FVC (%pred) ($p<0.05$). CAT score also correlates with the change in FEV_1 (%pred) and FVC (%pred) during a COPD exacerbation. Also, there was negative correlation between FEV_1 (%pred) and FVC (%pred) with CAT score in stable COPD patients. **Conclusion:** CAT scores correlates with PFT parameters in stable COPD as well as acute exacerbation of COPD. **Outcome:** CAT score can be utilized to assess the severity of COPD especially in resource limited setups where there is no facility for Pulmonary Function Testing and also it is cost effective.

INTRODUCTION

Chronic Obstructive pulmonary disease (COPD) is a respiratory disease with progressive airflow obstruction [1]. It is common cause of hospitalization and mortality. Presently, COPD is 5th leading cause of death worldwide and is projected to ascend to 4th rank in the year 2030 due to continuous exposure of population to the risk factors [2]&[3]. India is only next to china in contributing toward disease burden [4]. Till date common diagnostic tool for assessing airflow obstruction in COPD is pulmonary function test. [5] Even for those already diagnosed with COPD, it is required to do pulmonary function tests periodically to

assess the severity. PFT are not routinely available at Primary Health Centre. Chavez et al. reported only 58% of patients with airflow obstruction ever underwent PFT for confirming the diagnosis.[6] When patient is referred to higher center for PFT due to its unavailability, patient may not turn up. This is lost opportunity from public health point of view which can be overcome only if alternate simple tool is available for assessing COPD severity. COPD assessment Test (CAT) developed in the year 2009 is regarded as tool for assessing severity of COPD. It is 8 item 6 point scale with all the items ranked with responses graded on likert scale from 0-5 points where 0 denotes no severity and 5 denotes maximum severity[7].

The present research is aimed to study clinical utility of CAT score in COPD patients for assessing severity of the disease so that patient care is continued despite unavailability of PFT in resource limited settings.

MATERIALS AND METHODS

The present study is a Hospital based observational prospective study and was carried out at tertiary care centre in western Maharashtra under the department of Medicine. Approval of Institutional Ethics Committee was taken prior to commencement of study.

Department of Medicine follows standard clinical and diagnostic procedures to diagnose and manage COPD patients. The patients once diagnosed with COPD are followed up on regular basis. In the present study, COPD patients coming to OPD, those with exacerbation requiring hospitalization and those willing to participate were included as study participants. Patients with interstitial lung disease, bronchial asthma, history of myocardial infarction within 1 month, chest or abdominal pain of any cause, oral or facial pain exacerbated by a mouthpiece, stress incontinence, dementia or confusional state and BMI more than 25 kg/m^2 were excluded from the study.

The present study was done between September 2016 & August 2018. Total 100 patients (50 with Stable COPD and 50 with COPD exacerbation) were included after obtaining informed and written consent from them. CAT score noting and PFT for stable COPD patients was done during their routine OPD visit, while for patients with COPD exacerbation it was done on day1 and day5 of hospitalization. All the participants were subjected to Case Record Form (CRF) which was a standardized questionnaire that captured socio-demographic information, brief history and COPD assessment test (CAT) score. CAT score was compared to PFT parameters in stable COPD patients. And change in CAT score was compared with change in PFT parameters during COPD exacerbation. Also CAT score and PFT parameters of stable COPD patients were compared with that of acute exacerbation on day1 and day5 of hospitalization.

STATISTICAL ANALYSIS

Data entry and analysis was done using statistical software SPSS 20. Graphical presentation of data is done using Microsoft Office Excel 2010. Socio-demographic profile of the participants is represented as frequency and percentage. Association between study groups is assessed by student t test and chi-square test. Also, correlation coefficient was calculated to study direction of association between them, if any. P value of statistical tests less than 0.05 was considered to be significant.

RESULTS

In present study it was observed that in stable COPD group, 82% (n=41) were males and 18% (n=9) were females with mean age in years as 59.7 ± 10.21 while in COPD exacerbation group, 84% (n=42) were males and 16% (n=8) were females with mean age in years as 65.3 ± 4.01. Risk factor of smoking was present in 10% cases (n=5) of stable disease and 12% cases (n=6) of acute exacerbation.

The mean CAT score in stable COPD, acute exacerbation on day1 and day5 were observed as 20.98 ± 2.42, 33.92 ± 0.82 and 31.16 ± 0.95 respectively. The mean FEV_1 (%pred) in stable COPD, acute exacerbation on day1 and day5 were observed as 79.34 ± 6.30, 45.26 ± 7.19 and 48.80 ± 6.59 respectively. The mean FVC (%pred) in

stable COPD, acute exacerbation on day1 and day5 were observed as 89.53±6.42, 37.40±4.16 and 46.96±3.96 respectively as depicted in table no.1

Table 1: Demographic and Clinical Profile of study subject

Parameters		Stable COPD	COPD Exacerbation	
1. Age (in years)		59.7±10.21	65.3±4.01	
2. Sex	Male	82% (n=41)	84% (n=42)	
	Female	18% (n=9)	16% (n=8)	
3. Smoking		10% (n=5)	12% (n=6)	
			Day1	Day5
4. CAT Score		20.98±2.42	33.92±0.82	31.16±0.95
5. FEV$_1$ (%pred)		79.34±6.30	45.26±7.19	48.80±6.59
6. FVC (%pred)		89.53±6.42	37.40±4.16	46.96±3.96

It was observed that there is negative correlation between CAT score and FEV$_1$ (% pred) and FVC (% pred) in stable COPD patients which is statistically significant ($p<0.05$) as depicted in table no. 2

Table 2: Co-efficient of Correlation between CAT score and FEV$_1$ (% pred) and FVC (% pred) in stable COPD patients

Parameter	CAT score	P Value
FEV$_1$ (%pred)	r= -0.989	0.01
FVC (%pred)	r= -0.704	0.00

It was also observed that there was a negative correlation between change in CAT score and change in FEV$_1$ (%pred) and FVC (%pred) measured at day1 and day5 of hospitalization for COPD exacerbation which was statistically significant ($p<0.05$) as depicted in table no. 3.

Table 3: Co-efficient of Correlation between change in CAT score and change in FEV$_1$ (%pred) and FVC (%pred) in COPD exacerbation patients

Parameter	Change in CAT score	P Value
Change in FEV$_1$ (%pred)	r= -0.396	0.04
Change in FVC (%pred)	r= -0.900	0.00

We observed a statistically significant ($p<0.05$) association in CAT scores, FEV_1 (% pred) and FVC (% pred) when compared between stable COPD and day1 of exacerbation; and also between day1 and day5 of COPD exacerbation as shown in table no.4

Table 4: Association between CAT scores and PFT parameters

Paired Samples Test	Mean difference ± SD	T value	P value
CAT Score (Stable) - CAT Score (Acute Exacerbation day1)	-12.94±2.46	-37.2	0.00
FVC %Predicted (Stable) – FVC %Predicted (Acute Exacerbation day1)	52.22±6.31	58.49	0.00
FEV₁%Predicted (Stable) - FEV₁%Predicted (Acute Exacerbation day1)	34.08±8.63	27.92	0.00
CAT Score (Acute Exacerbation day1) - CAT Score (Acute Exacerbation day5)	2.76±0.62	31.24	0.00
FVC %Predicted(Acute Exacerbation day1) – FVC %Predicted (Acute Exacerbation day 5)	-9.56±2.31	-29.2	0.00
FEV₁%Predicted (Acute Exacerbation day 1)- FEV₁% Predicted (Acute Exacerbation day 5)	3.54±0.33	10.65	0.02

DISCUSSION

The present study is a hospital based prospective observational study which included 50 stable COPD and 50 COPD exacerbations patients. We noted that in stable COPD group 82% (n=41) were male and 18% (n=9) were females which is consistent with findings by Kurashima et al.[8] and Jindal et al.[9]

We observed a low (20.98±2.42) mean CAT score in stable COPD patients while a comparatively higher (33.92±0.82) mean CAT score on day1 of COPD exacerbation. These findings correspond to the study by Jones et al. who analyzed CAT scores in seven European countries and reported that CAT scores were significantly ($p<0.05$) lower in stable patients (17±8.3) than in acute exacerbation of COPD (21.3±8.4).[10]

In present study, a negative correlation between CAT score and PFT parameters was found in stable COPD patients which is statistically significant ($p<0.05$). This finding corresponds to study by Kurashima et al. which reported negative correlation between CAT score and FEV_1 (%pred) (r=-0.453) ($p<0.05$).[8] Similarly, a study by Hassan Ghobadi et al. reported a significant association between the FEV_1 (% pred) and CAT score (r=-0.55) ($p< 0.001$)[7]. Also, Choudhary Sumer et al. reported negative correlation between CAT score and FEV_1 (% pred).[12]

As compared to day1 of COPD exacerbation there was evident rise in FEV_1 (%pred) from 45.26±7.19 to 48.8±6.59) and fall in CAT scores (from 33.92±0.82 to 31.16±0.95). These findings corresponds with study by You-Hui Tu et al. which reported that with 7 days of treatment there was significant rise in FEV_1 (%pred) and significant decline in CAT scores.[11]

In the present study, risk factor of smoking was present in 10% cases of stable disease and in 12% cases of COPD exacerbation. The high percentage of non-smokers having COPD could be due to exposure to biomass fuel combustion, outdoor pollution, occupational exposure and many other factors. This finding is similar to the findings of S. Salvi et al.[13]

CONCLUSION

The CAT score provides a simple and reliable measure of overall COPD related health status and it correlates well with PFT parameters in stable disease and during an acute exacerbation. In addition, it is cost effective and can be easily used in resource

limited setups where access to other objective measurements like spirometry is limited.

REFERENCES

1. WHO Factsheet. Chronic obstructive pulmonary disease (COPD). WHO, Geneva, Switzerland 1 December 2017 available at https://www.who.int/news-room/fact-sheets/detail/chronic-obstructive-pulmonary-disease-(COPD). Accessed on 7 Oct 2018.

2. Colin D. Mathers, Dejan Loncar. Projections of Global Mortality and Burden of Disease from 2002 to 2030. November 2006; Volume 3, Issue 11, e442

3. Global Initiative for Chronic Obstructive Lung Diseases. Pocket guide to COPD diagnosis, management and prevention. A Guide for Health care Professions. 2018 edition. Available at https://goldcopd.org/wp-content/uploads/2018/02/WMS-GOLD-2018-Feb-Final-to-print-v2.pdf. Accessed on 05 December 2018.

4. Toshita Kalkana et. al. Increasing burden of COPD in rural India: an example why India warrants primary healthcare reforms. ERJ Open Res 2016; 2: 00032-2016

5. Cooper, Christopher B. Assessment of pulmonary function in COPD. Seminars in Respiratory and Critical Care Medicine. April 2005. Issue 02. 246-52

6. Pompeyo C Chavez, Navkiran Shokar. Diagnosis and Management of Chronic Obstructive Pulmonary Disease (COPD) in a Primary Care Clinic. COPD: Journal of Chronic Obstructive Pulmonary Disease. 2009; 6(6), 446-451.

7. Hassan Ghobadi, Saeid Sadeghieh Ahari, Azadeh Kameli, Sharzad M.Lari. The Relationship between COPD Assessment Test (CAT) Scores and Severity of Airflow Obstruction in Stable COPD Patients. Tanaffos 2012; 11(2): 22-26

8. Kurashima K, Takaku Y, Ohta et al. COPD assessment test and severity of airflow limitation in patients with asthma, COPD, and asthma–COPD overlap syndrome. International Journal of COPD 2016:11 479–487.

9. Jindal SK. COPD: the unrecognized epidemic in India. JAPI 2012; Vol. 60 Suppl., 14–16.

10. Jones PW, Brusselle G, Dal Negro RW et al. Properties of the COPD assessment test in a cross-sectional European study. Eur Respir J. 2011, 38: 29-35.

11. You-Hui T, Yan Zhang Y and Guang-He F. Utility of the CAT in the therapy assessment of COPD exacerbations in China. BMC Pulmonary Medicine 2014 14-42.

12. Choudhary Sumer, Abraham Rini, Tayade B, Khan Shafee, Doshi Virag, More Vishal. CAT Score in Chronic Obstructive Pulmonary Disease, Impact on Health: Assessment in Our Region. Panacea Journal of Medical Sciences, January-April, 2016;6(1): 13-19

13. Sundeep Salvi et. al. Prevalence of COPD in a rural population in India. European Respiratory journal. Sept. 2014. vol. 38 no. Suppl 55.