



CORRELATION OF 6MWD WITH FEV1% & DLCO% IN COPD PATIENTS

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ABSTRACT **BACKGROUND:** Chronic obstructive pulmonary disease is the third leading cause of death worldwide, causing 3.23 million deaths in 2019 according to WHO. Nearly 90% of COPD deaths in those under 70 years of age occur in low and middle income countries (LMIC). There may be a considerable financial burden due to limitation of workplace and home productivity, and costs of medical treatment. Spirometry is used not only for confirming the diagnosis but also for grading the severity of COPD. 6MWD test has gained importance in the assessments of functional exercise capacity in patients with COPD and other Respiratory diseases. Diffusion Capacity of the Lung for Carbon Monoxide (DLCO) has been employed as an additional investigation to aid in assessing the properties of gas transfer in many respiratory diseases. **MATERIALS AND METHODS:** It is a hospital based cross sectional and analytical study performed over a period of 12 months (June 2021-june 2022) in the department of Respiratory medicine, Narayana medical college and hospital, Nellore, in 30 patients diagnosed with COPD and patients were subjected to 6MWD, spirometry and DLCO. **RESULTS:** Correlation between FEV1% & DLCO%, FEV1% & 6MWD and DLCO% & 6MWD were done respectively. Among the first correlation (FEV1% & DLCO%) there is a statistically significant moderate and strong positive correlation observed in severe and very severe patients respectively. Among the second correlation (FEV1% & 6MWD) only in the whole sample there is statistically significant moderate positive correlation observed. Among the third correlation (DLCO% & 6MWD) only in severe patients of COPD there is a statistically significant moderate positive correlation observed. There is a slightly greater correlation for DLCO% & 6MWD compared to FEV1%. **CONCLUSION:** In severe COPD patients decline in 6MWD can be used to monitor the disease progression where as the decline in DLCO% can be used to keep track of the severe and very severe stages of COPD. Incorporating of DLCO in grading COPD severity can help as a marker of exercise capacity limitation.

KEYWORDS : COPD, 6MWD, FEV1%, DLCO

INTRODUCTION

Chronic Obstructive Pulmonary Disease (COPD) is a common, preventable and treatable disease that is characterized by persistent respiratory symptoms and airflow limitation that is due to airway and/or alveolar abnormalities usually caused by significant exposure to noxious particle or gases and influenced by host factors including abnormal lung development. COPD is a disease of immense epidemiological and clinical importance. It is one of the leading cause of death in the world. It is a major cause of chronic morbidity and mortality throughout the world. 6MWT is a sub-maximal exercise test used as a clinical indicator of the functional capacity in patients with cardiopulmonary disease. 6MWT is a simple and inexpensive test. The purpose of 6MWT is to test exercise tolerance, monitor therapy and predict prognosis in patients with chronic respiratory disease like COPD. Spirometry is used not only for confirming the diagnosis but also for grading the severity of COPD. Diffusion Capacity of the Lung for Carbon Monoxide (DLCO) has been employed as an additional investigation to aid in assessing the properties of gas transfer in many respiratory diseases.

MATERIALS AND METHODS

STUDY DESIGN: A hospital based cross-sectional and analytical study.

STUDY SETTING: Department of Respiratory Medicine, Narayana Medical College and Hospital, Nellore.

PERIOD OF STUDY: 12 months (June 2021 to June 2022).

SAMPLE SIZE: 30 patients diagnosed as Chronic Obstructive Pulmonary Disease according to GOLD guidelines 2020. After detailed clinical history, patients were subjected to 6MWT, Spirometry and DLCO.

INCLUSION CRITERIA

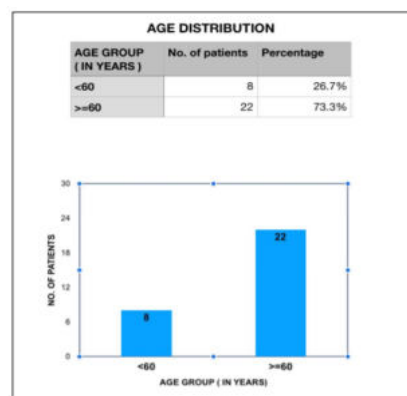
- Age ≥ 40 years.
- Patients diagnosed as COPD according to GOLD guidelines 2020.

- Patients willing to participate in the study.
- Patients of COPD in whom Single Breath DLCO can be done.

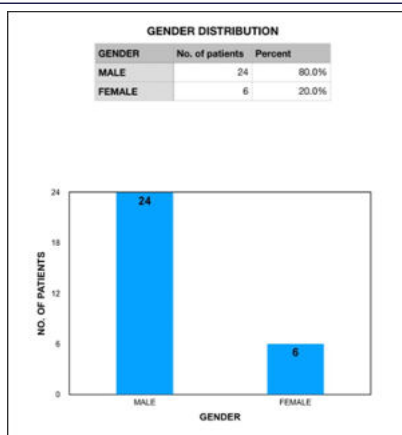
EXCLUSION CRITERIA

- Patients with absolute and relative contraindications to Spirometry and DLCO tests.
- Patients with associated other lung diseases like Asthma, Bronchiectasis.
- Patients on LTOT
- STATISTICAL ANALYSIS: Data was analyzed using Microsoft Excel and statistical analysis was done using SPSS version 20.
- Pearson correlation was used to study the correlation between two continuous variables.
- P-value less than 0.05 was considered statistically significant.

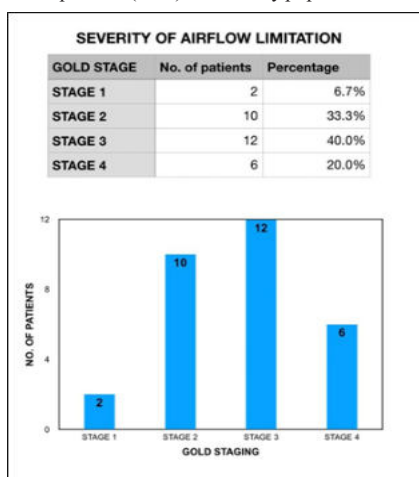
RESULTS



- In my study, 8 patients (26.7%) are included in the age group less than 60 years and 22 patients (73.3%) are included in the age group of more than 60 years



- In my study, males constitute 24 patients (80%) and females constitute 6 patients (20%) of the study population.



- 2 patients (6.7%) were included in COPD Stage 1 (Mild COPD),
- 10 patients (33.3%) in COPD Stage 2 (Moderate COPD)
- 12 patients (40%) in COPD Stage 3 (Severe COPD) and
- 6 patients (20%) were included in COPD Stage 4 (Very Severe COPD).

DESCRIPTIVE STATISTICS OF THE STUDY

VARIABLE	MEAN	STANDARD DEVIATION	RANGE
AGE	64.3	8.9	47-79
FEV1% pred	47.0	17.8	21-87
DLCO% pred	41.7	12.8	25-75
6MWD(in meters)	332.8	44.4	250-416

CORRELATION BETWEEN FEV1% and DLCO%

		DLCO %
WHOLE SAMPLE	Correlation coefficient (r)	0.799
	P-value	< 0.00001
MODERATE COPD	Correlation coefficient (r)	-0.1561
	P-value	0.6669
SEVERE COPD	Correlation coefficient (r)	0.5821
	P-value	0.0471
VERY SEVERE COPD	Correlation coefficient (r)	0.8209
	P-value	0.0456

In the whole sample, there is statistically significant strong positive correlation between FEV1% and DLCO%.

- Among Severe and Very Severe COPD, there is statistically significant moderate and strong positive correlation respectively between FEV1% and DLCO%.
- In Moderate COPD, there was negligible negative correlation between FEV1% and DLCO% which was not statistically significant.

CORRELATION BETWEEN FEV1% and 6MWD

		6MWD
WHOLE SAMPLE	Correlation coefficient (r)	0.645
	P-value	0.00011
MODERATE COPD	Correlation coefficient (r)	-0.28
	P-value	0.43330
SEVERE COPD	Correlation coefficient (r)	0.0529
	P-value	0.8724
VERY SEVERE COPD	Correlation coefficient (r)	0.802
	P-value	0.05492

- In the whole sample, there is statistically significant moderate positive correlation between FEV1% and 6MWD.
- In Moderate COPD, there was weak negative correlation between FEV1% and 6MWD which was not statistically significant.
- In Severe COPD, there was a negligible positive correlation between FEV1% and 6MWD which was not statistically significant.
- In Very Severe COPD, there was strong positive correlation between FEV1% and 6MWD which was not statistically significant.

CORRELATION BETWEEN DLCO% and 6MWD

		6MWD
WHOLE SAMPLE	Correlation coefficient (r)	0.8525
	P-value	< 0.00001
MODERATE COPD	Correlation coefficient (r)	0.8419
	P-value	0.2248
SEVERE COPD	Correlation coefficient (r)	0.6719
	P-value	0.0167
VERY SEVERE COPD	Correlation coefficient (r)	0.8051
	P-value	0.05327

- In the whole sample, there is statistically significant strong positive correlation between DLCO% and 6MWD.
- In Moderate COPD, there was strong positive correlation between DLCO% and 6MWD which was not statistically significant.
- In Severe COPD, there was a statistically significant moderate positive correlation between DLCO% and 6MWD.
- In Very Severe COPD, there was strong positive correlation between DLCO% and 6MWD which was not statistically significant.

DISCUSSION

The present study has found a statistically significant strong positive correlation between both FEV1% and DLCO% and 6MWD. In moderate COPD, FEV1% had a negative correlation with 6MWD. When DLCO% and 6MWD were compared among COPD stages, only Severe COPD had a statistically significant correlation. There was a slightly greater correlation for DLCO% and 6MWD compared to FEV1%. FEV1% and DLCO% are associated with a decline in 6MWD. 6MWD has been found to be an excellent predictor of decrease in exercise capacity. In patients of COPD, 6MWD is a prognostic marker which may help in identifying high risk individuals. A major advantage of DLCO is its ability to accurately echo the impairment of gas exchange in the lungs which is seen in case of the emphysematous phenotype as well as the pulmonary vascular phenotype. Both these phenotypes have a major impact on the decrease in exercise capacity. In patients of COPD who have a low 6MWD, DLCO can help in differentiating whether the limitation of exercise is related to co-morbid conditions and depression states causing functional limitation or the presence of ventilation-perfusion defects affecting the airway dynamics. There was a statistically significant positive (direct) correlation between FEV1% and DLCO% in severe and very severe stages. FEV1% decline was associated with decline in DLCO%. Similar findings were reported in Brashier et al. The present study as well as the one aforementioned were found fit with Mohsefinar et al who found that early decline of DLCO% was associated with rapid FEV1% decline and accurately predicted exercise capacity limitation in severe stages and has an impact on COPD mortality. Mamata Heda et al also reported a similar significant correlation between FEV1% and DLCO%. In the current study, moderate COPD patients did not show a significant correlation between FEV1 % and DLCO% suggesting that the decline in airflow limitation is an independent entity compared to reduction in diffusion capacity which is essentially a marker of lung parenchymal and alveolar-capillary vascular bed destruction.

CONCLUSION

In severe COPD patients decline in 6MWD can be used to monitor the disease progression where as the decline in DLCO can be used to keep

track of severe and very severe stages of COPD. 6MWD is a simple predictor of exercise desaturation and exercise limitation in COPD. Incorporating DLCO in addition to FEV1% in COPD patients helps in assessing the severity and prognosis.

LIMITATIONS OF THE STUDY

There is certain limitation to the current study. The first limitation includes a not large enough sample size. Although DLCO has a proven impact in guiding COPD prognosis and therapy, it is not routinely employed due to the high costs involved. Second limitation would be the low proportion of mild stage COPD patients, hence the relationship of DLCO with all the stages of COPD could not be established in our study.

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