

Effectiveness of Standard Treatment Outcome for Different Stages of Chronic Obstructive Pulmonary Disease Patients: Role of 6 Minute Walk Test

D S M Zakir Hossain^{1*}, Md. Ali Hossain², Md. Sakur Khan³

^{1*}Assistant Professor, Respiratory Medicine, Patuakhali Medical College, Patuakhali, Bangladesh.

²Professor, Respiratory Medicine, National Institute of Diseases of the Chest and Hospital, Dhaka, Bangladesh.

³Assistant Professor, Respiratory Medicine, National Asthma Center, Mohakhali, Dhaka, Bangladesh.

ABSTRACT

Background: Chronic Obstructive Pulmonary Disease (COPD) is defined as a avertible and curable disease characterized by “persistent airflow limitation” that is usually advanced and associated with an heightened chronic inflammatory response in the airways, and the lung tonoxious particles or gases. Habitual smoking of cigarette represents the most significant risk for impeding COPD, as well as low birth weight, recurrent infections, indoor air pollution with biomass fuel, low socio-economic status, occupational exposure such as xoyal dust, silica, cadmium etc, Different stages of COPD based on post bronchodilator FEV1, in patients with FEV1/FVC <0.70.

Aim: To find out the effectiveness of the combined treatment outcomes by studying the patients with different stages of severity of Chronic Obstructive Pulmonary Disease.

Methods: A Prospective study was carried out during the period from 1st June 2018 to 31st December 2018 in the outpatients department (OPD) of Patuakhali 250 Bed Sadar Hospital, Patuakhali. One Hundred and Fifty COPD patients were included in this study. The study was conducted by measuring the response of patients with by following the “6 Minute Walk Test” or [^] MWT. It assessed the changes of 6 minute walk distance in response to treatment in COPD patients with different severities excluding very severe disease, and acute exacerbations and bronchial asthma. Measurement of treatment outcome of Stable chronic COPD patients by 6MWT proves useful tool alternative to Spirometry as a simple, inexpensive, safe method.

Results: 6MWD has a positive correlation with FEV1 and strong negative correlation with CAT scores in the follow-up visits of COPD patients as shown by the findings of this study.

Conclusion: In monitoring of combined treatment outcome of COPD patients, 6MWT can be used as an alternative tool in perspective areas where spirometry is unavailable or not feasible because of safety issues, simplicity, better reflectivity of changes in quality of life, inexpensiveness and it signify visible improvement by patient as majority of the patient can't understand their own improvement in FEV1.

Key Words: Chronic Obstructive Pulmonary Disease, Stages of COPD, 6MWT / 6MWD, GOLD.

*Correspondence to:

Dr. D S M Zakir Hossain,
Assistant Professor,
Respiratory Medicine,
Patuakhali Medical College,
Patuakhali, Bangladesh.

Article History:

Received: 30-05-2019, Revised: 27-06-2019, Accepted: 25-07-2019

Access this article online	
Website: www.ijmrp.com	Quick Response code 
DOI: 10.21276/ijmrp.2019.5.4.044	

INTRODUCTION

COPD as a mind bogging issue requires a multifaceted methodology as to clinical appraisal and reaction to therapy. COPD prompts a decrease in exercise limit that influences the personal satisfaction and expands mortality of these patients. Various endeavors have been made to decide functional capacity in patients who have COPD.

Gold global COPD guideline¹⁻³ portrayed that spirometry is the gold standard for exact and repeatable measurement of lung function. Fev1 is utilized to characterize the seriousness of the

sickness. Fev1 associates feebly with dyspnoea, representing just 12% of the fluctuation in dyspnoea as estimated by the baseline dyspnoea index (BDI). A few patients are not constrained in their exercises notwithstanding when fev1 is diminished to 35% of anticipated worth, though others are kept to wheelchairs. This puzzle focuses to the requirement for other appraisal tools.⁴ Spirometry is anyway just a single method for deciphering COPD infection seriousness where spirometry isn't effectively accessible. Likewise, different estimates, for example, the MMRC dyspnoea

scale. Quantitative evaluation of manifestations like dyspnoea, estimation of PEFr and exercise test like 6-minute walk test (6MWT), which are less expensive methods of diagnosis, can be considered to substitute the spirometry rather if spirometry isn't accessible then both organizing of the infection and follow up of patient should be possible based on seriousness of symptoms, PEFr and 6-MWT.⁵

Research center tests that evaluate functional capacity are tedious and exorbitant and are not very much acknowledged by patients. Exercise resistance evaluation of has picked up significance in understanding the effect of the sickness and following functional capacity changes coming about because of the infection movement or therapeutic intervention.⁶ The SIX-MINUTE WALK TEST was created which was demonstrated to be dependable and legitimate as an appraisal for exercise resistance

for COPD.⁷ To quantify the capacity to perform day by day living exercises. The 6-MWT is a goal strategy, to assess the functional status, screen therapy, or survey the prognosis in patients with pulmonary diseases., It is all the more regularly performed because of its straightforwardness, reasonableness, great unwavering quality, legitimacy and the negligible mechanical necessities are the principle points of interest of the 6-MWT, just as the way that vital signs and symptoms can be estimated during the test. Pretty much every patient is equipped for understanding the impacts of the treatment, with the exception of those that are most influenced by sickness.⁸ To assess the improvement in COPD patients following the standard treatment, an unassuming exertion was taken. In this examination, the level of progress was recorded in the follow up visits of standardized treatment and it was contrasted and spirometric parameters.

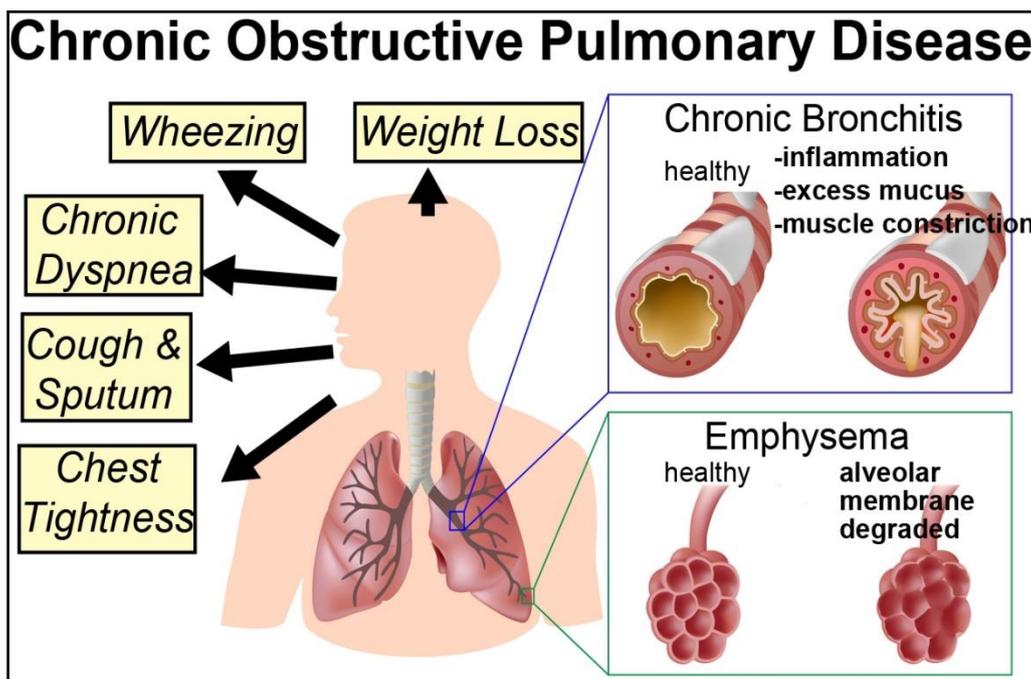


Figure 1: Chronic Obstructive Pulmonary Disease

OBJECTIVES OF THE STUDY

Main Objective

The study aims to find out the effectiveness of the combined treatment outcomes by studying the patients with different stages of severity of Chronic Obstructive Pulmonary Disease.

Specific objectives

- To identify the severity of the COPD patient,
- To analyze the outcome standard treatment, and
- To measure the outcomes with 6-MWT.

MATERIALS AND METHODS

Study Type

This prospective observational and comparative study was done in order to gauge the improvements of functional status with progressive time in COPD patients in Patuakhali 250 Bed Sadar Hospital, Patuakhali, as a quick and inexpensive standard tool. On the basis of the inclusion criteria and exclusion criteria, initially, 150 cases were enrolled in the study. Of them 100 patients completed two follow-ups and were included in the final analysis of the study.

Inclusion Criteria

The inclusion criteria of this study are:

- Clinical diagnosis of COPD, as defined by GOLD.
- Respiratory symptoms (Cough, shortness of breath and sputum production)
- Clinically stable airway obstruction.
- Participants, who gave consent and were willing to comply with the study procedures

Exclusion Criteria

Extremely severe patients of the Pulmonary Disease were directly excluded as the study requires the patients to have a comparatively higher functional status as well as sound mind.

RESULTS

On the basis of the inclusion and exclusion criteria initially 150 patients were enrolled in the study. Of them 100 cases completed two follow-ups and were included in the final analysis for the study. The findings derived from the data analysis are presented in table 1.

Figure-2 depicts the smoking status/situation of the 100 samples. Majority of the patients were smokers (64%) and about one-third (30%) of the patients were in the process of quitting smoking or ex-smoker. Only 6 patients (6%) were complete non-smokers. Table 2 depicts the COPD staging of the patients in the start of the observation process of the study. Majority of the patients belonged in Stage 3 of the disease followed by the stage 4 patients. Table 3, figure-3, and figure 4 detail the 1st and 2nd follow up after the baseline measure and comparison of desaturation after 6MWT

between Baseline and During Follow-up.

Figure-5 shows the relationship between 6-MWT and The FEV1 and figure 6 shows the comparison at 1st follow-up. On the other hand, table 4 details the comparative analysis of FEV1 during the 1st and 2nd follow up data with the baseline dataset.

Figure 7 shows the correlation of the 1st follow up CAT score with the 6-MWT analysis of the same visitation of the patients. Then, the change in the FEV1 and FVC at the 1st follows up and the 2nd follow up is respectively shown in the table 5 and table 6.

Table 1: Distribution of the Patients as Per Body Mass Index (BMI). (n=100)

BMI	Frequency	Percent
Underweight	40	40%
Normal	51	51%
Overweight	5	5%
Obese	4	4%
Total	100	100%

Table 2: Distribution of the patients according to stages of COPD at baseline

COPD Stage at baseline	No. of Patients	Percent (%)
Stage 1	1	1
Stage 2	24	24
Stage 3	48	48
Stage 4	27	27
Total	100	100

Table 3: Comparison of 6-Minute Walk Distance (6MWD) between baseline and follow-up visits in different stages of COPD.

Stage of COPD	Baseline (mean ± SD)	At 1st follow up (mean ± SD)	At 2nd follow up (mean ± SD)
Stage 1	1040	1090	1270
Stage 2	1122.31 (±170.442)	1285.04 (±214.263)	1378.68 (±203.928)
Stage 3	950.95 (±319.384)	1096.39 (±281.423)	1212.36 (±290.717)
Stage 4	774.77 (±302.765)	900.00 (±312.050)	1067.63 (±276.308)

Table 4: Comparison between baseline and follow-up FEV1.

Parameter	Baseline (mean ± SD)	At 1st follow-up (mean ± SD)	At 2nd follow-up (mean ± SD)
FEV1 (% of predicted)	40.11 (±14.41)	42.60 (±15.82)	44.04 (±15.90)

Table 5: Change in FEV1 & FVC at 1st follow-up

Baseline values of the parameter (mean ± SD)	Change in parameters (mean ± SD)	% of increase in the parameter	p-value
FEV1 *40.11 (±14.48)	2.49 (±6.45)	6.21	<0.001
FVC* 66.35 (±19.16)	3.93 (±6.027)	5.92	<0.001

Table 6: Change in FEV1 & FVC at 2nd follow-up

Baseline values of the parameter (mean ± SD)	Change in parameters (mean ± SD)	% of increase in the parameter	p-value
FEV1 *40.12 (±14.48)	3.93 (±6.03)	9.80	<0.001
FVC* 66.34 (±19.16)	3.42 (±9.731)	5.14	<0.001

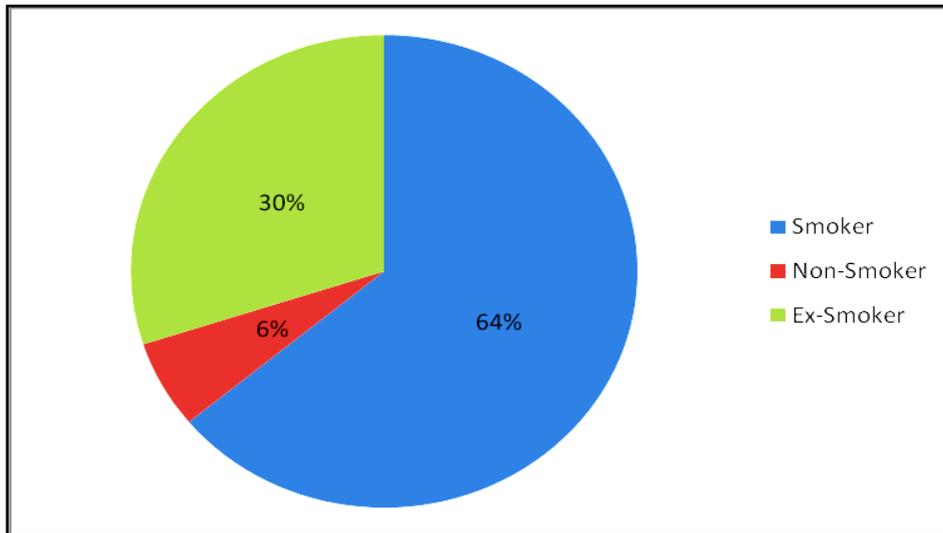


Figure-2: Distribution of Samples by Smoking Status. (n=100)

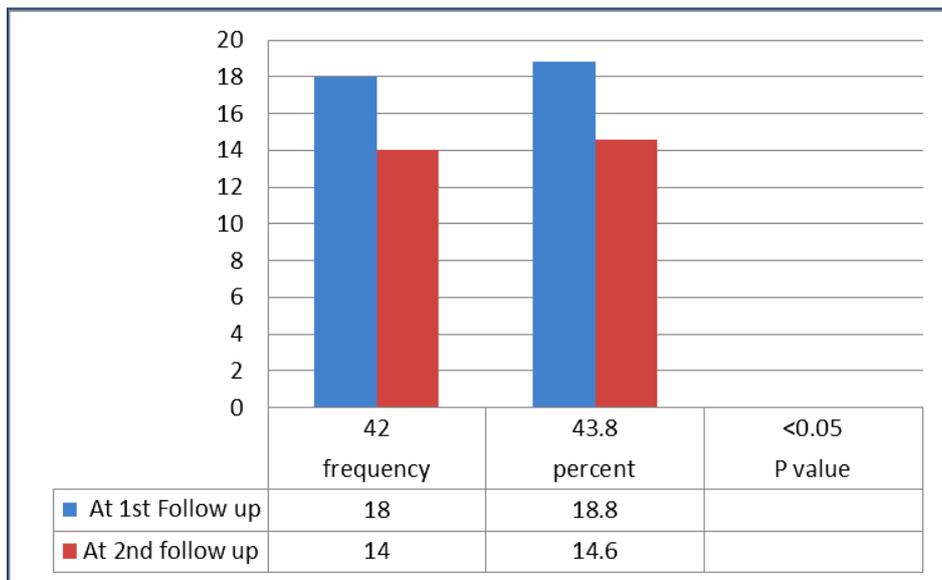


Figure 3: Comparison of Desaturation after 6MWT between Baseline and During Follow-up

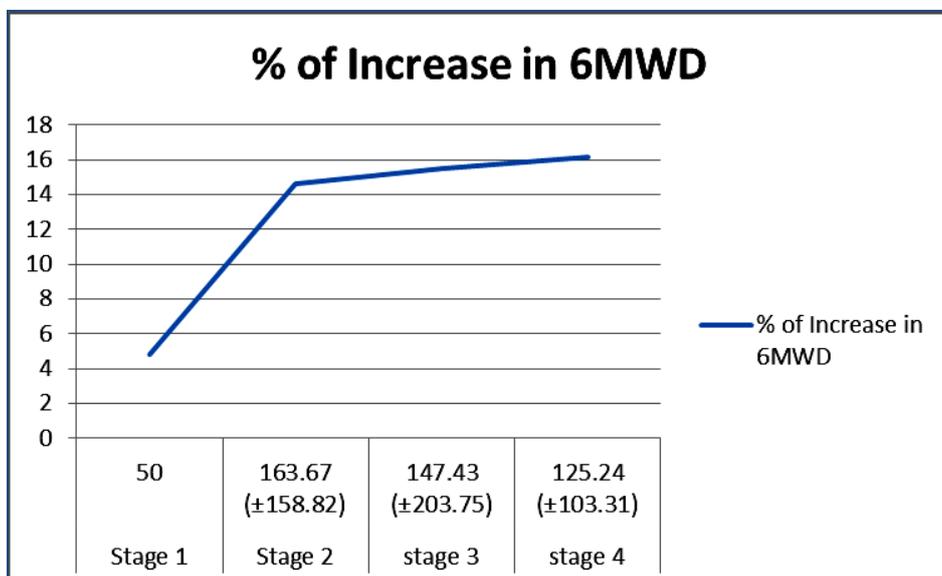


Figure 4: Increases in 6-Minute Walk Distance (6MWD) at 1st follow-up in different stages of COPD patients.

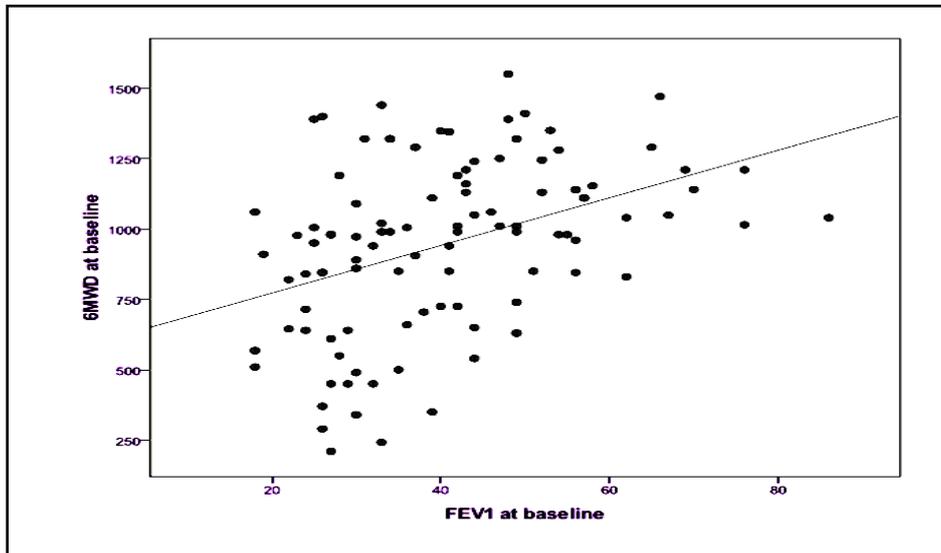


Figure 5: Scatter diagram showing correlation between 6MW and FEV1 at baseline

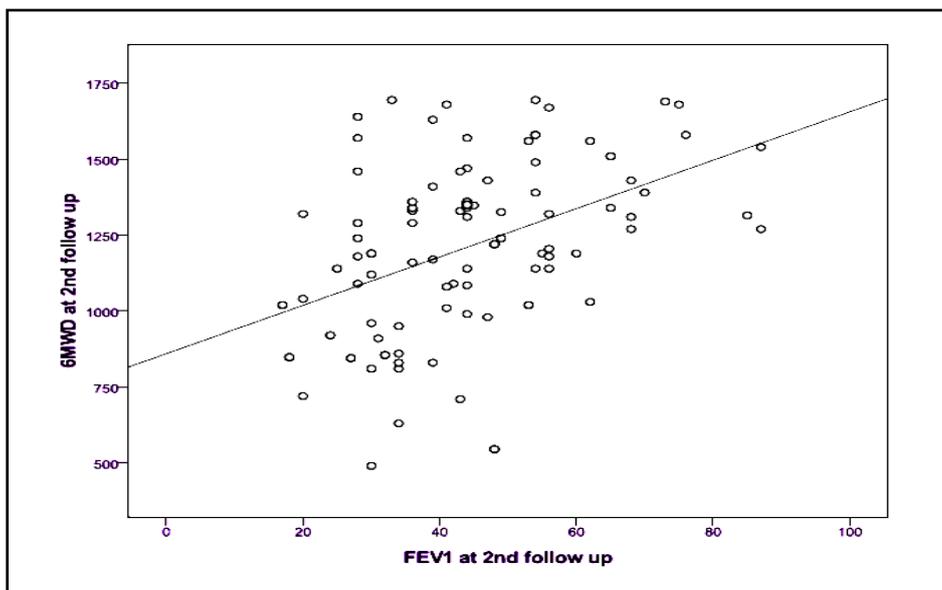


Figure 6: Scatter diagram showing correlation between 6MWD and FEV1 at 2nd follow up

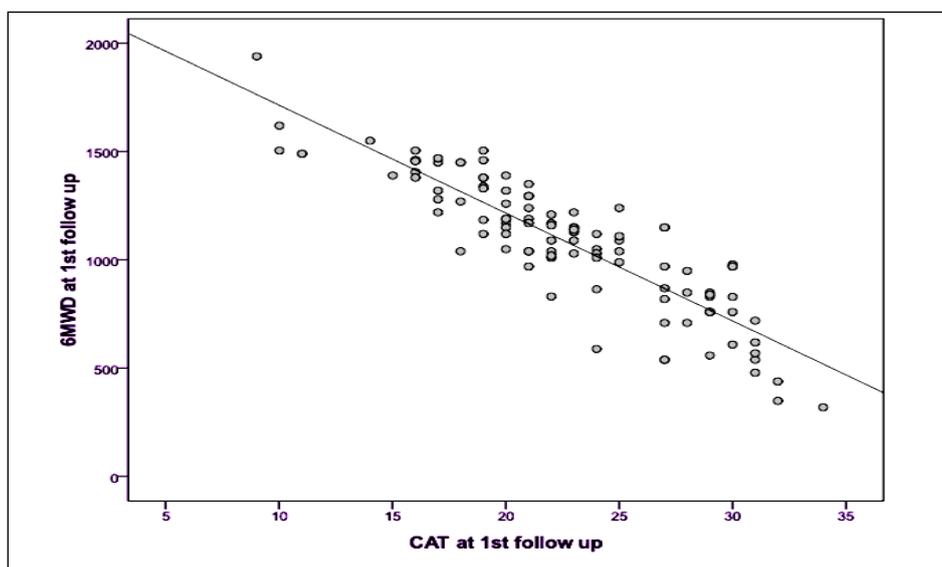


Figure 7: Scatter diagram showing correlation between 6MWD and CAT score at 1st follow up

DISCUSSION

Initially 150 patients were enrolled in the study. Out of them 100 patients completed the required two follow ups; first follow up was after 2 weeks of standard optimum treatment, and the second and last one was after 12 weeks of standard optimum treatment. The causes of drop outs were death in 4 patients, then the later diagnosis associated Bronchial Carcinoma in 5 patients while the rest of the patients refuse to come due to economic or behavioral constrain. Majorities the patients were smokers (64.6 %) and had normal BMI at 51%. Regarding the stage or severity of the disease, about 48% of the patients had stage 3 COPD; almost 27% of the patients had stage 4 and stage 2 COPD (24%). Additionally, Gautam et al. (2014) in their study found almost the number of stage 2 (40.2%) and stage 3 (42.7%) patients. At baseline, 42 patients had desaturation after 6MWT evidenced by $\geq 3\%$ fall of O₂ saturation. But level of desaturation after 6MWT lessened considerably during follow up visits, which was statistically significant ($p < 0.001$).

In this study, 100 patients were examined at baseline and during the two follow ups for 6-Minute Walk Distance (6MWD). After getting standard optimum treatment changes in 6MWD in different stages of COPD were appraised. A significant increase was observed in the stage 2, 3, and 4. When the patients of all stages added up together the increase in 6MWD at 1st follow-up was at almost 144.2 (± 170.4) feet and that of the 2nd follow up was 262.6 (± 197.00) feet.

COPD Assessment Test (CAT) scores were measured and compared between baseline and follow up visits. It was observed that the scores decreased significantly during follow up visits ($p < 0.001$). The significant change between baseline and follow up visits spirometry parameters such as percentage predicted of FEV₁ and FVC was also found. At 1st follow up, change in FVC was 3.93 ± 6.03 which is more than the change in FEV₁ almost (2.5 ± 6.5). These changes were statistically significant ($p < 0.05$). At 2nd follow up, change in FEV₁ was 3.93 ± 6.0 and change in FVC was 3.42 ± 9.73 . These changes were also statistically significant ($p < 0.001$).

Two previous prospective studies have demonstrated that the 6MWT is a better predictor of mortality than FEV₁ in patients with very severe COPD.⁹ 6MWT result in patients suffering from COPD has been found to be more reproducible than the measurement of FEV₁.¹⁰ Moreover and it was more sensitive in differentiating patients with low or high work capacity.¹¹

CONCLUSION

In conclusion, 6MWD has positive correlation with FEV₁ and strong negative correlation with CAT score in the two follow up visits of COPD patients. After many different analysis, it is clearly visible that 6MWT can be used as an alternative tool in monitoring of treatment outcome of COPD patients in areas where spirometry is not available and because of its safety, simplicity,

inexpensiveness, better reflectivity of changes in quality of life and it signify visible improvement by patient as patient can't understand improvement in FEV₁.

REFERENCES

1. Davidson, s, 2018, Principle & practice of medicine, Elsevier, 23rd Edition.
2. GOLD: pocket guide to COPD diagnosis, Management and prevention-2018 report.
3. GOLD international COPD guideline- 2014.
4. Somanath Dash, Anil Kumar Kodavala, Samir Ranjan Nayak, K. V. Ramana Rao, N. Durga Prasad, Saladi Sridurga. Pyopneumothorax with An Unusual Etiology, IJCRR 2013; 5(10):76-83.
5. Pankaj N Maheshwari, Nitin Joshi, Reeta P Maheshwari. Best laser for prostatectomy in the year 2013, Indian Journal of Urology 2013; 29(3): 236-43.
6. Butland et al. Two-, six-, and 12-minute walking tests in respiratory disease. PMC 1982; May 29;284(6329):1607-8.
7. Casanova M, et al. Inhibition of active nuclear transport is an intrinsic trigger of programmed cell death in trypanosomatids. Cell Death Differ 2008; 15(12):1910-20.
8. Am J Respir Crit Care Med. 2003, Erratum: ATS Statement: Guidelines for the Six-Minute Walk Test.
9. Pinto- Plata, VM et al. 2004. The 6-min walk distance: change over time and value as a predictor of survival in severe COPD, Eur Respir J. 2004 Jan;23(1):28-33.
10. Knox, P. Planning and applied geography. Progress in Human Geography 1988; 12(4), 567–574. <https://doi.org/10.1177/030913258801200408>
11. Six-Minute Walk Test to Assess COPD Patients. Am Fam Physician. 2004 Jan 1;69(1):172-174.

Source of Support: Nil. **Conflict of Interest:** None Declared.

Copyright: © the author(s) and publisher. IJMRP is an official publication of Ibn Sina Academy of Medieval Medicine & Sciences, registered in 2001 under Indian Trusts Act, 1882.

This is an open access article distributed under the terms of the Creative Commons Attribution Non-commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

Cite this article as: D S M Zakir Hossain, Md. Ali Hossain, Md. Sakur Khan. Effectiveness of Standard Treatment Outcome for Different Stages of Chronic Obstructive Pulmonary Disease Patients: Role of 6 Minute Walk Test. Int J Med Res Prof. 2019 July; 5(4):180-85. DOI:10.21276/ijmrp.2019.5.4.044