

Original research article**Exercise capacity by six minute walk test among COPD patients under pulmonary rehabilitation****¹Dr. Vijay Kumar Shettar, ²Dr. Lavanya S Peter, ³Dr. Spurthi K**¹Assistant Professor, Department of Pulmonary Medicine, VIMS, Bellary, Karnataka, India²Associate Professor, Pulmonary Medicine, ESIC Medical College and Hospital, Sedam Road, Kalaburagi, Karnataka, India³Senior Resident, Department of Pulmonary Medicine, VIMS, Bellary, Karnataka, India**Corresponding Author:**

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Abstract

Increasing severity of COPD is associated with frequent exacerbations and need for hospitalization, but for every stage of severity, severe exacerbations are associated with increase in short and long term all-cause mortality. Exacerbations have a negative impact on prognosis and mortality. The six minute walk test (6MWT) is a simple test used to measure the functional capacity of patients with respiratory disorders. The test measures the distance (6MWD; meters) that a patient can quickly walk on a flat hard surface in a period of six minutes. Each patient was explained about the procedure prior to the test. The test was performed on a hospital hallway measuring 100 feet in length. Within group comparison, there was statistical significant difference seen both in intervention (P .0005) and control group (P .0005) compared to baseline. In intervention group it improved from 170.3 to 210.7mts, whereas it changed from 172 to 192mts in control group, these values show more significant change was in intervention group than control group.

Keywords: Exercise capacity by six minute walk test, COPD, pulmonary rehabilitation**Introduction**

An exacerbation of COPD is defined as an acute worsening of respiratory symptoms that result in additional therapy.

Several triggers precipitate exacerbations of COPD. Lower respiratory tract infections account for 50% of exacerbations, while the remaining are caused by exposure to indoor or outdoor air pollutants, weather changes and several host factors including poor compliance to therapy ^[1].

In COPD, comorbidities occur frequently, particularly those related to ageing, smoking and physical inactivity, such as cardiovascular disease, lung cancer, skeletal muscle dysfunction, metabolic syndrome, depression and osteoporosis. Comorbidities rarely exist individually: <3% of people with COPD have no comorbidities and >50% of COPD patients have three or more comorbidities ^[2].

The chronic systemic inflammation that is linked to COPD may also initiate or exacerbate comorbid diseases, such as cardiovascular disease, osteoporosis, anaemia, type 2 diabetes, lung cancer and depression and is one of the key mechanisms underlying these extra-pulmonary effects ^[3].

Increasing severity of COPD is associated with frequent exacerbations and need for hospitalization, but for every stage of severity, severe exacerbations are associated with increase in short and long term all-cause mortality. Exacerbations have a negative impact on prognosis and mortality. Preventing exacerbations results in preservation of lung function and prevents deterioration hence patient should be compliant with regular follow ups, adherence to treatment is important ^[4].

Early PR was associated with reduced 90-day readmission and shortened LOS without worsened ADL in patients with exacerbation of COPD. These findings suggest that early PR should be conducted in patients with exacerbation of COPD ^[5].

Early respiratory rehabilitation exercise training package in hospitalized elderly patients with AECOPD reduced AECOPD symptoms (such as dyspnoea and cough), increased exercise tolerance, and sputum expectoration ^[6].

Methodology**Sample size:** A sample size of 60 patients (30 interventional and 30 control) were taken by using single proportion-absolute precision method.**Type of study:** Prospective interventional study.

Inclusion criteria

- COPD Stage 2 to Stage 4 according to GOLD 2016 guidelines.
- Either gender.
- Age >40yrs.
- Willing to give informed written consent.

Exclusion criteria

- Patients with persistent sepsis.
- Patients with unstable angina, recent myocardial infarction, Congestive cardiac failure.
- Haemoglobin < 10gm/dl.
- Patients with tuberculosis/lung cancer.
- H/O atopy.
- Cognitive impairment.
- Severe neurological disease.
- Disabling Arthritis.

Method of data collection

- Patients were recruited from department of Respiratory medicine admitted with acute exacerbation of COPD
- Detailed clinical history and complete clinical examination was done
- Appropriate investigations were done (Complete haemogram, Blood sugar, Electrolytes, Chest x ray, Arterial blood gas analysis, Sputum for gram stain and culture and sensitivity, ECG, PFT at time of discharge)
- 60 patients were recruited for the study on the basis of inclusion and exclusion criteria and randomized into two groups (Interventional and Control group)
- A written informed consent was obtained from the patient
- Patients were treated according to GOLD (global initiative for chronic obstructive lung disease) 2016 guidelines. Interventional group received pulmonary rehabilitation in addition to usual care, two to three sessions daily of 20-30 minutes duration each session, from third day to tenth day/discharge whichever was latest. Pulmonary rehabilitation included education, psychological support, following exercises. Control group received only usual care.

Exercise capacity by Six minute walk test: (as per American Thoracic Society (ATS) guidelines) the six minute walk test (6MWT) is a simple test used to measure the functional capacity of patients with respiratory disorders. The test measures the distance (6MWD; meters) that a patient can quickly walk on a flat hard surface in a period of six minutes. Each patient was explained about the procedure prior to the test. The test was performed on a hospital hallway measuring 100 feet in length. The turnaround points were marked with cones. The patient was seated at the test site 10 minutes before commencement. Baseline measurements of pulse, blood pressure, oxygen saturation was done during this time period. Patients in need of supplemental oxygen were provided with it during the test. The distance covered was recorded at the end of the test.

Results**Table 1:** Table Showing Pre and Post Difference of 6 MWD between Cases and Controls

	Pre & Post Difference in 6MWD
Cases	40.3
Controls	20.0

Between two group's comparison, there was statistical significant difference (P.0005)) seen in pre and post difference in 6 MWD i.e. difference in distance covered was more in intervention group (40.3mts) compared to control group (20mts).

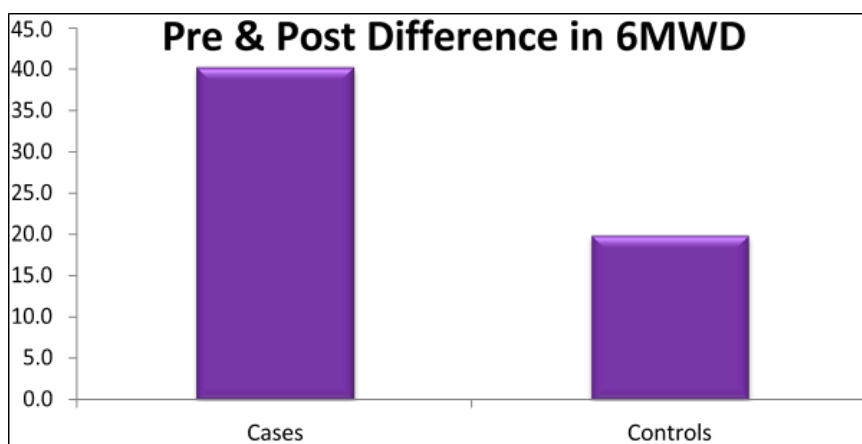


Fig 1: Bar Diagram Showing Pre and Post Difference in 6 MWD between Cases and Controls

Table 2: Table Showing Paired Statistics of Pre and Post 6 MWD among Cases

Paired Samples Statistics					P value
	N	Mean	Std. Deviation	Std. Error Mean	
Pair 1	6 MWD Pre	30	170.33	36.245	6.617
	6 MWD Post	30	210.67	39.298	7.175

Controls

Table 3: Table Showing Statistics of Pre and Post 6mwd among Controls

Paired Samples Statistics					P value
	N	Mean	Std. Deviation	Std. Error Mean	
Pair 1	6MWD Pre	30	172.00	37.176	6.787
	6MWD Post	30	192.00	40.718	7.434

Table 4: Table Showing Pre and Post 6 MWD Values among Cases and Controls

6 MWD	Pre (MTS)	Post (MTS)
Cases	170.3	210.7
Controls	172.0	192.0

Within group comparison, there was statistical significant difference seen both in intervention (P .0005) and control group (P .0005) compared to baseline. In intervention group it improved from 170.3 to 210.7mts, whereas it changed from 172 to 192mts in control group, these values show more significant change was in intervention group than control group.

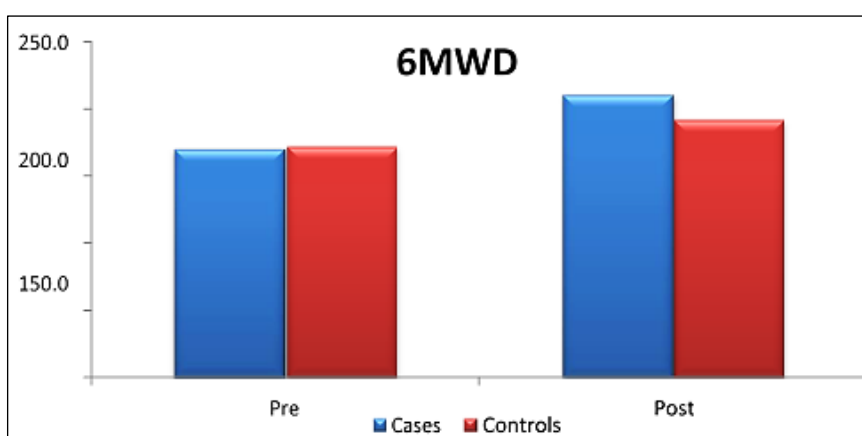


Fig 2: Bar Diagram Comparing Pre and Post Increase in Distance (Improvement) among Cases and Controls

Discussion

Pulmonary rehabilitation is indicated for individuals with chronic respiratory disease who have persistent symptoms or disability despite standard medical therapy [7].

1. Obstructive Diseases

COPD, persistent asthma, diffuse bronchiectasis, cystic fibrosis, bronchiolitis obliterans.

2. Restrictive Diseases

Interstitial lung disease, occupational or environmental lung diseases, chest wall diseases, kyphoscoliosis, ankylosing spondylitis

3. Neuromuscular diseases

4. Other Diseases

Pulmonary hypertension, lung cancer, before and after thoracic and abdominal surgery, before and after lung transplantation, lung volume reduction surgery, ventilator dependency, obesity related respiratory disease.

COPD is the most common disease for which patients are referred, often for one or more of the following symptoms or conditions^[8]:

1. Severe dyspnea and/or fatigue.
2. Decreased exercise ability.
3. Interference with performing activities of daily living.
4. Impaired health status.
5. Decreased occupational performance.
6. Nutritional depletion.

There are two primary exclusion criteria for pulmonary rehabilitation:^[9, 10]

1. An associated condition that might interfere with the rehabilitative process. Examples include disabling arthritis and severe neurologic, cognitive, or psychiatric disease.
2. A comorbid condition that might place the patient at undue risk during exercise training. Examples include severe pulmonary hypertension or unstable cardiovascular disease.

Endurance training (also known as conditioning) is the most common exercise training employed in pulmonary rehabilitation programs. Endurance exercise can be performed using lower or upper extremity exercise. Improving skeletal muscle function decreases the ventilatory requirements of exercise and improves exercise capacity. Endurance exercise training with an arm or leg ergometer is typically prescribed three to five times a week with continuous exercise for 20 to 30 minutes at 60 percent of the individual's maximal work rate or greater.

Conclusion

Between two group's comparison, there was statistical significant difference (P .0005) seen in pre and post difference in 6MWD i.e. difference in distance covered was more in intervention group (40.3mts) compared to control group (20mts).

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