



“To study the effect of chest physiotherapy on PEFr in patients with COPD: An experimental study”

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Abstract:

Spirometry is commonly accepted as the gold standard for the diagnosis of COPD but quality assured spirometry cannot be provided universally around the globe along with lack of availability of spirometers in primary health care due to financial limitations or limited availability of expert technicians or clinicians to perform the procedure. Peak flow meter is portable, hand held, easy to use and low cost device which can also be used to measure airflow limitation. The exercises are help full to improve mucus clearance, reduce work of breathing, increase strength, power and endurance of respiratory muscles. 41 patients with COPD were treated with home based physiotherapy and PEFr was measured as an outcome measure which is statistically significant. Patients with COPD with greater changes in PEFr causes more frequent hospitalization and increased mortality and morbidity due to COPD related complications which can also be reduced as patient can check PEFr level regularly.

Index Terms: COPD, PEFr, Positive expiratory pressure therapy, Spirometry

INTRODUCTION:

American Thoracic Society/European Respiratory Society (ATS/ERS) guidelines defined chronic obstructive pulmonary disease (COPD) as an irreversible and progressive airflow limitation. It is now the fourth leading cause of death in the world¹. COPD causes a significant disease burden based on its severity and clinical course².

Spirometry is commonly accepted as the gold standard for the diagnosis of COPD^{3, 4}. The American Association for Respiratory Care supports the National Lung Health Education Program (NLHEP) to promote the appropriate use of spirometry by primary health care practitioners for the detection of COPD in adult smokers⁵. The reality remains that quality assured spirometry cannot be provided universally around the globe. Another problem that spirometers may not be available or used properly in primary health care due to financial limitations or limited availability of expert technicians or clinicians to perform the procedure⁶.

Peak flow meter is portable, hand held, easy to use and low cost device. It is mainly used to see the exacerbation in the patients with asthma and to check the airflow through the [bronchi](#) and thus the degree of obstruction in the airways. PEF measurement may rule out severe to very severe COPD without the need for pre- and post-BD spirometry testing⁷. In a recent multicenter study, Burden of Obstructive Lung disease (BOLD), Jithoo and colleagues concluded that the use of peak expiratory flow (PEF), with a $2.2 \text{ L}\cdot\text{s}^{-1}\cdot\text{m}^{-2}$ threshold was a simple, cost effective initial screening tool for conducting COPD case-finding in adults aged ≥ 40 years⁶. Assessment of this parameter is important for early detection and prevention of complications related to COPD for leading a healthy life. Patients with COPD with greater changes in PEFr causes more frequent hospitalization and increased mortality and morbidity due to COPD related complications.⁸

COPD cannot be cured but the symptoms can be controlled with Pharmacological, surgical and physiotherapy management⁹. The exercises are help full to improve mucus clearance, reduce work of breathing, increase strength, power and endurance of respiratory muscles.^{10, 11} Patients with COPD follow the exercises only during the hospital stay or during stage of acute exacerbation. Patients do not fully understand the importance of exercises after discharge or at home.

So, this study is performed to see, if PEFr can be used to evaluate the changes in airway obstruction in COPD patients after home based physiotherapy treatment.

Aim of the study:

- To evaluate the effect of physiotherapy treatment on PEFr in COPD patients.

Hypothesis:

- **Null Hypothesis (H0)**

Physiotherapy treatment is not effective in improving pulmonary functions in patients with COPD.

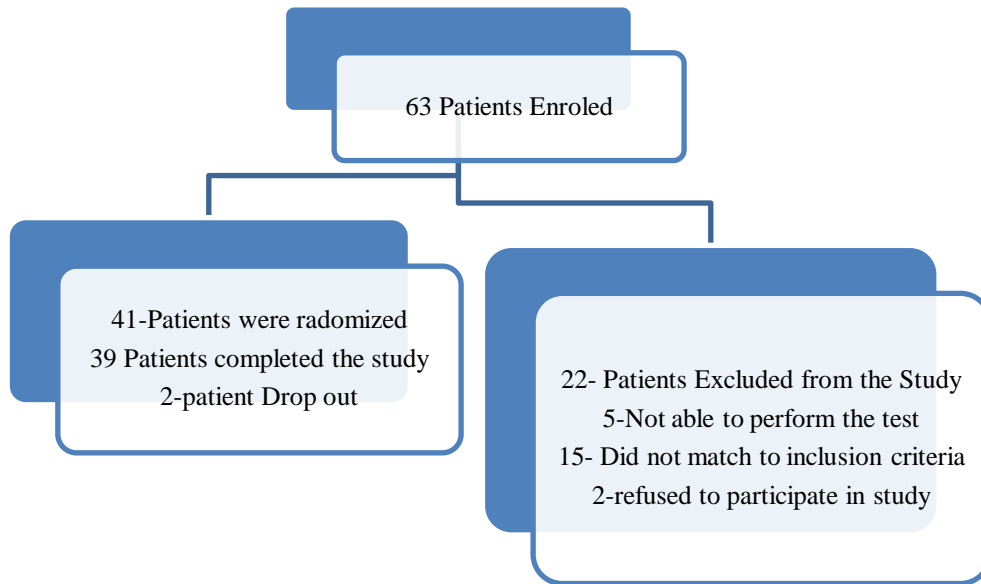
- **Experimental Hypothesis(H1)**

Physiotherapy treatment is effective in improving pulmonary functions in patients with COPD.

MATERIALS AND METHODOLOGY:

- The study was approved by institutional ethical committee.
- **Study design:** An Experimental Study
- **Setting of the study:** This study was conducted at different hospitals and different communities of Ahmedabad.
- **Duration of the study:** One week
- **Sample size:** 39 COPD Patients
- **Sample selection:** patients, diagnosed with COPD by physician and fulfilling inclusion criteria were selected
- **Inclusion criteria:**
 - Male and female with age between 40 to 60 years
 - Patients with mild to very severe COPD according to the GOLD classification
 - Hemodynamically stable patients
- **Exclusion criteria:**
 - Any other associated cardiovascular or pulmonary disease
 - Patients recently under gone thoracic or abdominal surgeries
 - Recent facial, oral or skull surgeries or trauma
 - Acute sinusitis
 - Acute hemoptysis or nausea
 - Patients on ventilator
 - Any orthopedic condition of spine or thoracic cage
 - Uncooperative patients

• **Procedure:**



Graph-1 Data Distribution

Patients were taught Relaxation, Diaphragmatic breathing and pursed lip breathing exercises, positive expiratory pressure exercises and forced expiratory maneuver if needed. Follow up was taken every day on call for the exercises.

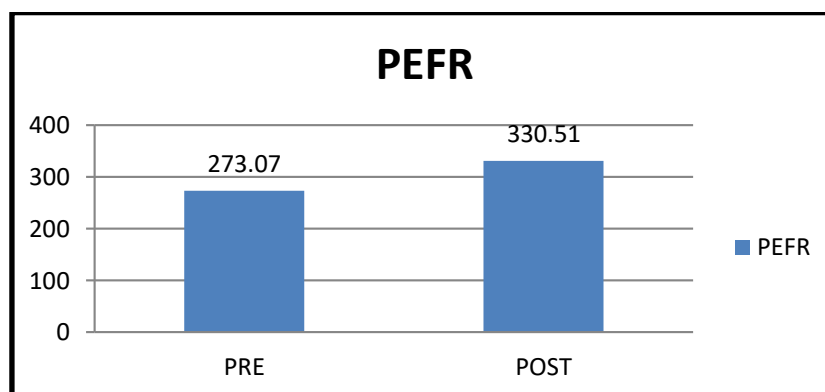
Firstly patients were asked to relax shoulder girdle and upper chest. Diaphragmatic breathing was performed for 8-10 times per session. Pursed lip breathing exercise was performed for 5-8 times. Patients were asked to perform PLB whenever they feel breathless. Patients had performed 10-20 PEP breaths followed by 2-3 huffs or cough. The whole treatment session was last for 15- 20 minutes which was performed two times a day. After one week outcome measures were again taken which was statistically analyzed with SPSS version 20.

RESULTS:

Analysis of the data was done with the SPSS and Microsoft Excel. Paired sample t test was applied to analyze the data.

TABLE-1 - MEAN DIFFERENCE OF PEFR

	Pre		Post		t- value	p-value
	Mean	SD	Mean	SD		
PEFR	273.07	110.67	330.51	117.11	-10.407	0.0001



Graph-1- MEAN DIFFERENCE OF PEFR

DISCUSSION

- Pre and post interventional difference were compared with Peek expiratory flow meter.

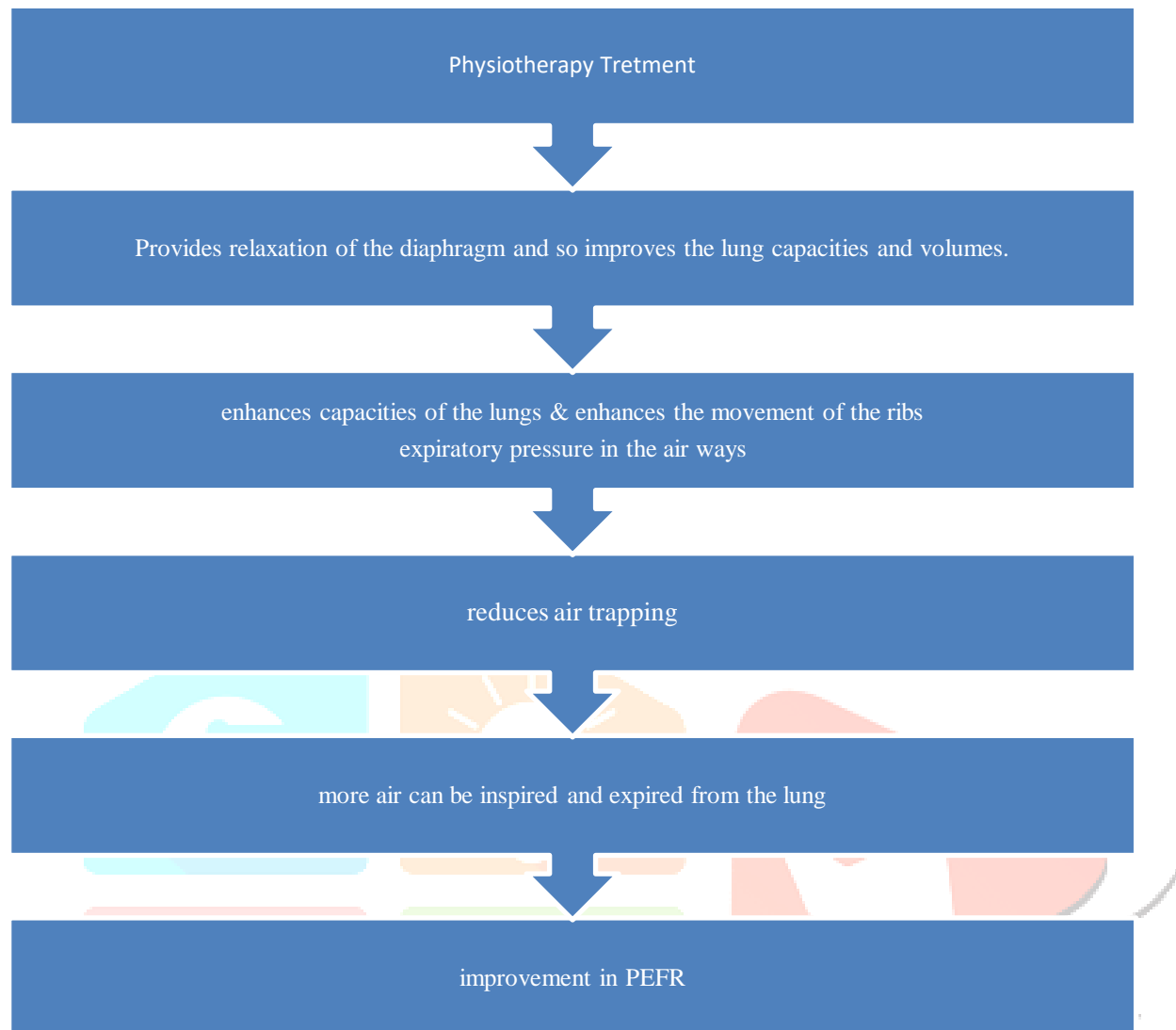


Chart-2 Reason for changes in PEFR

CONCLUSION:

- COPD patients treated with physiotherapy intervention shows clinical as well as statistical significant improvement in PEFR.

Clinical implication:

- Present study proves that changes in condition of patients with COPD can be checked with PEFR and so follow up with physiotherapy can be done better. This parameter is important for early detection and prevention of complications related to COPD for leading a healthy life. Patients with COPD with greater changes in PEFR causes more frequent hospitalization and increased mortality and morbidity due to COPD related complications which can also be reduced as patient can check PEFR level regularly.

Limitations of the study:

- Small sample size
- Short duration of study
- Short duration of intervention
- Blind was not applied

Possible future studies:

- Study can be done with larger sample size
- Larger study duration can be implicated
- Long duration of intervention can be performed
- Follow up study can be done
- Result can be divided according to the stages of the COPD
- Comparison of different treatment protocols can be done

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