

# To Compare the Effectiveness of Neurophysiological Facilitation Technique Versus Pursed Lip Breathing Exercise to Improve Lung Function among Geriatric COPD Patients

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**Abstract:** *Background of the Study:* Chronic Obstructive Pulmonary Disease is a common and progressive disorder that is characterized by respiratory symptoms and airflow limitation due to the abnormalities of the airway or alveoli. In this condition, the lung parenchyma gets damaged causing the changes in structure and results in collapse of airways. Neurophysiological facilitation technique and pursed lip breathing exercise can improve the lung functions. NPF of respiration is the selective external proprioceptive and tactile stimuli that produce reflective movement response in the ventilator. PLB has been advocated to reduce respiratory rate and increase oxygen saturation. It is maneuver that is frequently taught to patients with COPD. **Materials and Methodology:** This is a comparative study conducted at the Physiotherapy OPD of Tagore medical college & hospital, Chennai. the sample size was 30 subjects, and the duration is 5 weeks (4days per week and 20 sessions). The inclusion criteria was: Patients previously diagnosed geriatric COPD patients of both the genders, age between 60 - 80 years. The exclusion criteria were any recent sternum and rib fracture, coronary heart disease, recent surgery like rib fracture, smoking and alcoholic, pulmonary hypertension. **Result:** Neurophysiological Facilitation Technique shows significant improvement in mean value at  $p < 0.001$ .

**Keywords:** Chronic obstructive pulmonary disease, Neurophysiological facilitation, Pursed lip breathing, incentive spirometer, peak expiratory flow meter.

## 1. Introduction

Chronic obstructive pulmonary disease (COPD) is a preventable and manageable lung disease. People with COPD usually have shortness of breath and a feeling of tiredness. Early in this disease, people with COPD may feel mild to moderate shortness of breath when they physically exert. As the disease progresses, it can become severe. <sup>[1]</sup> A person with COPD may have chronic bronchitis, emphysema, asthma, and bronchiectasis. The amount of each of these conditions differs from person to person. <sup>[2]</sup> COPD is usually diagnosed in individuals who are older than 60 years. Individuals who have diagnosed the age of 50 or younger are diagnosed with early onset COPD, cumulative smoking for 10 years can cause airflow limitation, changes in lung shape, or decrease in lung function is increased. <sup>[3]</sup>

Chronic obstructive pulmonary disease (COPD) can lead to several musculoskeletal changes due to factors such as decreased physical activity, chronic inflammation, and steroid use.

## 2. Procedure

30 subjects were selected based on inclusion criteria. After getting consent, they were divided into two groups, Group A and Group B, Each group consists of 15 members. The entire procedure was explained to the

subjects. Group A - treated with neurophysiological facilitation techniques & Group B - treated with pursed lip breathing exercises.

### 1) Techniques:

#### Group A: Neuro Physiological Facilitation Technique

##### Inter costal stretch

**Position of the patient:** sitting

##### Procedure

Intercostal stretch is provided by applying pressure to upper border of rib in direction that will widen the space above it pressure should be applied in downwards direction not inward, stretch was maintained as the patient continues to breathe in his usual manner, as the stretch was maintained, a gradual increase in inspiratory movement in and around area being stretched occur.

When performing over an area of instability as in presence of paradoxical movement of upper rib cage or over decreased mobility. This procedure is effective in restoring normal breathing pattern where epigastric excursion can be observed and increase in area being stretched. This represents reflexive activation of diaphragm by intercostal afferent that innervate its margin.



## 2) Vertebral pressure

**Position of patient:** Supine lying

### **Procedure:**

A firm pressure was applied directly over the vertebrae of upper and lower thoracic cage activates dorsal intercostal muscles, pressure should be applied with open hand and must be firm enough to provide some stretch.

### **a) Vertebral pressure high,**

- Manual pressure apply to upper thoracic vertebrae T2 - T5
- Response obtain was increase in epigastric excursion.
- Deep breathing

### **b) Vertebral pressure low,**

- Pressure over lower thoracic vertebrae T7 - T 10
- Response obtain was increase in respiratory movement of apical thorax.



### 3) Anterior stretch lifting posterior basal area

**Position of patient:** Supine lying

**Procedure:**

- Placing the hands under ribs and lifting gently upward.
- The lift was maintained and provides a maintained stretch and pressure posteriorly and anterior stretch.
- Response obtain as a result the lift is sustained and stretch was maintained and increase in movement of ribs in lateral and posterior direction can be seen and felt, increase in epigastric movement and expansion of posterior basal.



### 4) Maintained manual pressure

**Position of the patient:** lying

**Procedure:**

- From contact of open hands was maintained over an area in which expansion is desired gradual increase in excursion of ribs under contact will be felt.
- This was useful procedure to obtain expansion in any situation where pain is present for instance when there is chest tubes or cardiac surgery which may have required splinting of sternum.
- Manual contact over the posterior chest wall is also useful and comfortable for person with chronic obstructive pulmonary disease.

### 5) Perioral pressure

**Position of the patient:** sitting

**Procedure:**

- Perioral stimulation was provided by applying firm maintained pressure to the patient top lip being carefully not to occlude the nasal passage (the use of surgical gloves to avoid contamination) the response to this stimuli is brief for 5 seconds a period of apnea followed by increase in epigastric excursion
- Pressure was maintained for the length of time the therapist wishes the patient to breath in active pattern.
- As the stimuli was maintained the epigastric excursion may increase so that movement is transmitted to the upper chest and the patient appears to deep breathing.



### Group B: Pursed Lip Breathing Technique

**Position of the patient:** sitting

Instruction was given to the participants about proper technique for Pursed Lip Breathing. Supervise sessions was given, ensuring participants achieve the desired exhalation pattern. separate documentation was maintained about frequency and duration exercise.

**Technique applied,**

- Prepared the patient in relaxed and comfortable position,
- Relax the neck and shoulder muscles,
- Breathe in slowly through nose for two seconds with mouth closed,
- Purse the lips as though whistle or gently blow on a hot drink,
- Breathe out slowly and gently through pursed lips for four or more seconds. It may be helpful to count and should feel stomach slowly shrink as to exhale.

### 6) Co – contraction of the abdomen

**Position of the patient:** lying

**Procedure:**

- Pressure was applied simultaneously over the patient's lower lateral ribs and over the ilium in direction right angle to the patient.
- Moderate force was applied and maintained, believe that this procedure increases tone in abdominal muscles and activates diaphragm.
- The response obtain are depression of umbilicus, as the pressure was maintained increase abdominal tone is seen and palpated, in the presence of retained secretion abdominal contraction may produce coughing (as ventilation increase cough can occur in any procedure), in obese abdominal co - contraction has frequently result in decrease abdominal girth.



**No of patients:** 15, **Duration:** 5 weeks, **Treatment session:** 4 days/week, **treatment duration:** 10 minutes.

### 3. Data Analysis

**Table 1: Paired Samples Statistics**

The pre - test and post - test mean value of Group A (Neurophysiology facilitation Techniques) and Group B (pursed lip breathing) was measured by peak expiratory flow meter.

Variables	Mean	N	Std. deviation	Std. error mean	t	Df	Sig (2 - tailed)
Pair 1							
Pre test PEFM	196.67	15	71.98	18.58	19	14	0.0001
Post test PEFM	222	15	71.63	18.5			
Pair 2							
Pre test PEFM	173.33	15	48.65	12.56	1.4676	14	0.1643
Post test PEFM	174.67	15	47.94	12.38			

**Table 2: Paired samples statistics**

The pre - test and post - test mean value of Group A (Neurophysiology facilitation techniques) and Group B (pursed lip breathing) was measured by incentive spirometer.

Variables	Mean	N	Std. Deviation	Std. error mean	t	Df	Sig (2 - tailed)
Pair 1							
Pre test IC	1.33	15	<b>0.49</b>	<b>0.13</b>	10.6927	14	<b>0.0001</b>
Post test IC	2.73	15	0.46	0.12			
Pair 2							
Pre test IC	1.27	15	0.46	0.12	1.8708	14	0.0824
Post test IC	1.47	15	0.52	0.13			

**Table 3: Unpaired Sample**

The post- test values of Group A (Neurophysiological facilitation) and Group B (pursed lip breathing exercise) was measured by incentive spirometer and peak expiratory flow rate.

	Mean	t	P value
Post Test PEFM			
Group A	222	19	0.0001
Group B	174.67	1.4676	0.16
Post Test IS			
Group A	2.73	10.69	0.0001
Group B	1.47	1.8708	0.08

### 4. Result

**Table 1**

According to the table 1, Group A the pre - test mean value of peak expiratory flow meter is 196.67 and Post - test mean Value is 222.00 and the t - test value is 19.00. so, there is significant improvement in Group A with p value of 0.0001, In Group B, the pre - test mean value of peak expiratory flow meter is 173.33 and post - test value is 174.67 and the t - test value is 1.4676, hence there is no significant improvement in Group B with p value of 0.1643.

**Table 2**

According to the table 2, Group A the pre - test mean value of inspiratory capacity is 1.33 and post - test mean Value is 2.73 and t - test value is 10.6927 so, there is significant improvement in Group A with p value of 0.0824, In Group B, the pre - test mean value of inspiratory capacity of mean value is 1.27 and post - test value is 1.47 and the t - test value is 1.8708, hence there is no significant improvement in Group B.

**Table 3**

Shows the mean difference of both the groups was given. Since the p - value is less than 0.05 with 95% confidence

interval of the difference. So we accept the alternate hypothesis (H1). Hence there is a significant improvement in Group A and the p value is than Group B.

### 5. Conclusion

This study concludes that the lung function of geriatric COPD was significantly increased in Group A ( $p < 0.0001$ ), which indicates that the neurophysiological facilitation techniques will significantly improve lung function among geriatric COPD patients.

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