

# Effectiveness of Postural Drainage and Forced Expiratory Technique Along with Segmental Relaxation Technique on Airway Clearance in Chronic Obstructive Pulmonary Disease Patients

Apurva Girish Mehta<sup>1</sup>, Smita Chandrakant Patil<sup>2</sup>, Chandrakant Babaso Patil<sup>3</sup>, Khushboo Trishant Chotai<sup>4</sup>

<sup>1</sup>Intern, Faculty of Physiotherapy, <sup>2</sup>Assistant Professor, department of Musculoskeletal Sciences, Faculty of physiotherapy, <sup>3</sup>Assistant Professor, Department of Cardiopulmonary Sciences, Faculty of Physiotherapy,

<sup>4</sup>Assistant Professor, Department of Sports Sciences, Faculty of Physiotherapy, Krishna Institute of Medical Sciences Deemed to be university, Karad, Maharashtra, India

## Abstract

**Background:** Chronic Obstructive Pulmonary Disease is the major leading cause of death. In COPD, mostly death occurred due to inappropriate airway clearance. So if these condition left untreated then this inflammation leads to repeated cycles of injury and repair of the airway wall. Few studies have shown the effect of postural drainage and forced expiratory technique on COPD patients for airway clearance. In this study postural drainage and forced expiratory technique along with segmental relaxation from Laura Mitchell Relaxation Technique use for mucus clearance as soon as possible in COPD patients

**Aim:** To study the effect of segmental relaxation followed by postural drainage and forced expiratory technique on airway clearance in COPD patients.

**Material and Method:** In this pre-post intervention study 28 individuals with COPD were included. They were randomly divided into 2 groups with 14 individuals in each group. Group A were treated with segmental relaxation from Laura Mitchell Relaxation Technique along with postural drainage and forced expiratory technique and Group B were treated with postural drainage and forced expiratory technique. After pre-post assessment, data was analysed with the help of appropriate statistical methods.

**Conclusion:** In that postural drainage and forced expiratory technique has less effect than these techniques that is postural drainage and forced expiratory technique along with segmental relaxation from Laura Mitchell Relaxation Technique in COPD patients.

**Keywords:** *segmental relaxation from Laura Mitchell Relaxation Technique, postural drainage, forced expiratory technique, mucus clearance in COPD patients.*

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## Corresponding author:

**Dr. Smita C. Patil,**

Assistant Professor, Department of Musculoskeletal Sciences, Faculty of Physiotherapy, Krishna Institute of Medical Sciences Deemed To Be University, Karad, Maharashtra, India.

Email id :- smitakanase@gmail.com

## Introduction

Chronic Obstructive Pulmonary Disease is the major leading cause of death.<sup>1</sup> In recent years, mucociliary dysfunction due to COPD is one of the leading cause of death. Globally 11.7% (14.3% male, 7.6% female) people suffering from COPD<sup>2</sup> and 2 to 22% among the men and 1.2 to 19% among women in different population-based studies through India.<sup>3</sup> According to

WHO, COPD is defined that a lung disease characterized by chronic obstruction of lung airflow that interferes that with normal breathing and is not fully reversible.<sup>1</sup>

The diagnosis of COPD are chronic bronchitis and emphysema. As chronic bronchitis and emphysema are different conditions but they relate to each other. In chronic bronchitis, there is inflammation of the bronchial tubes while emphysema is the atypical everlasting enlargement of the air sacs.<sup>1</sup> And the classification of COPD is based on the GOLD criteria; as they are mild, moderate and severe. In mild exacerbation, there is mild airflow limitation ( $FEV_1/FVC < 70\%$  but  $FEV_1 \geq 80\%$ ), in moderate stage, there is deteriorating of airflow limitation ( $30\% \leq FEV_1 \leq 80\%$  projected). In severe stage, there is severe airflow limitation ( $FEV_1 < 30\%$  projected).<sup>4</sup>

Respiratory tract infection is a precipitating factor in 70% to 80% of COPD, however about third of severe exacerbation of COPD cause can't be recognized.<sup>5,6</sup> The major cause of COPD is smoking; followed by places where air is dusty, smoky, polluted like coal mines and industries such as cement, textiles, chemicals and electro plating jewelry.<sup>1</sup> In India, 3-5 times more people suffering from COPD due to smoking than non-smoking.<sup>3</sup>

The main signs of COPD are infrequent shortness of breath particularly after exercise, long lasting periodic cough, mucus production. The indications of COPD are wheezing, weight loss, chronic dyspnea, cough and sputum, chest tightness, anxiety secondary to dyspnea.<sup>7</sup>

The airflow limitation due to narrowing of upper and lower respiratory track is an inflammatory response of the lung to noxious particles or gases. This progressive and relentless loss of muscle function is the result of emphysema due to destruction of lung parenchyma and narrowing of small airways as a result of chronic inflammation.<sup>8</sup>

The risk factors of COPD are Smoking and air pollution in that COPD is more common in males than in females nevertheless there is an increase in tobacco smoking among females. Some studies have demonstrated that air pollution suggestively proliferations the risk of exacerbations.<sup>9,10,11</sup> Normal drainage of secretions hampered due to effect of smoking, air pollution, micro-organisms and many more factors which causes COPD.<sup>12</sup> previous study showed that presence of green

sputum as opposed to white sputum indicates that there is high bacterial load in respiratory tract secretion.<sup>13</sup>

To cure this condition treatment is necessary. In this study to assess the lung capacity O<sub>2</sub> saturation, peak flow meter and MMRC grades were used. From these outcome measures we can see the lung capacity and can also interpreted the severity of the condition. So if these condition left untreated then this inflammation leads to repeated cycles of injury and repair of the airway wall.<sup>14</sup> in this study treatment protocol included segmental relaxation, postural drainage and forced expiratory technique. This segmental relaxation from Laura Mitchell's Relaxation technique, principles of this technique are 1. Tightening or contracting muscles results in movement 2. Movement causes reposition of the joints and limbs 3. when we are awake, the brain will register a change in body position through muscle, joint and skin sensation. 4. The brain is only aware of the movement it causes. Movements are controlled by the nervous system; if one group of muscles is instructed to tighten, the opposite group of muscles for that action receives an instruction to relax.<sup>15</sup> followed by postural drainage, in that position and chest manipulation (percussion, vibration and shaking) are required to dislodge the secretions and to remove the secretions throw-out the body coughing and huffing combining both termed as forced expiratory technique.<sup>16</sup>

## Methods

An experimental study was carried out using pre and post study design. The place of the study was Krishna institute of medical sciences, Physiotherapy department, Karad. There were 28 participants in the study with COPD. The samples were chosen using the simple random sampling method. Participants was included as per inclusion and exclusion criteria.

## Results

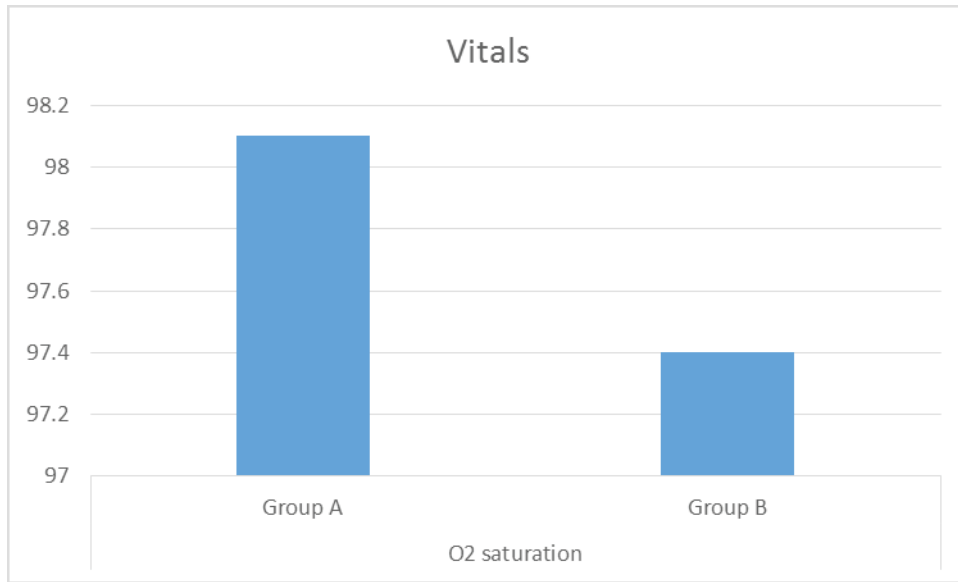
There were 28 patients enrolled, among which 14 were randomly place in experimental and controlled group respectively.

The percentage of age group 40-60 years of group A and group B is 14.28% and 35.71% respectively. Then age group 61-80 years of group A and group B is 50% and 35.71%. And last age group 81-100 years of group A and group B is 35.71% and 28.57% respectively. And

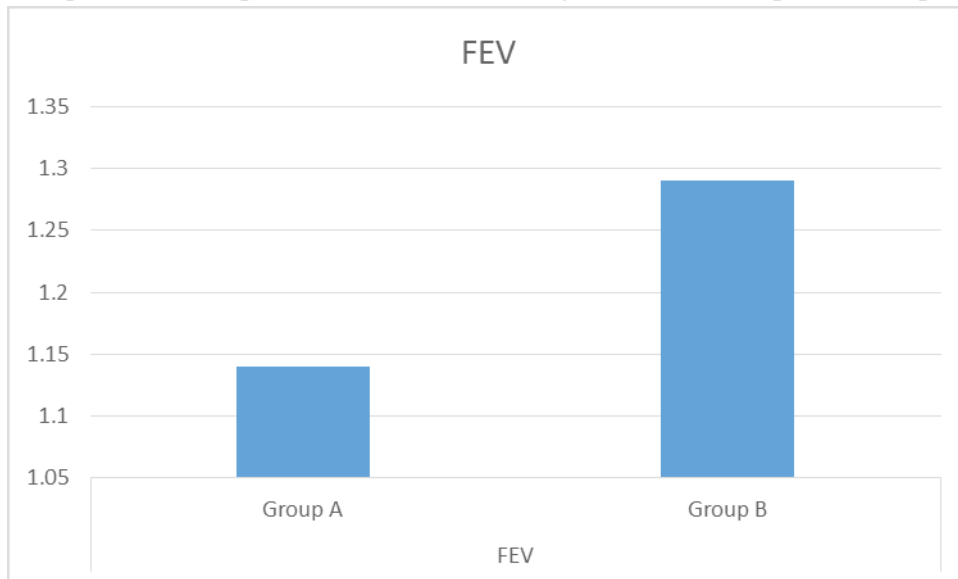
the frequency of males and females in group A is 10 and 4 respectively while in group B is 9 males and 5 females were there.

Table 1 shows that mean and standard deviation of both groups as well as paired t value and p values of vitals, peak flow meter and MMRC grades. In that the values are mentioned in this table is not only for morning sessions but also afternoon session and this values were taken before and after the treatment.

Table 1 shows that mean and standard deviation of both groups as well as paired t value and p values of vitals, peak flow meter and MMRC grades. In that the values are mentioned in this table is not only for morning sessions but also afternoon session and this values were taken before and after the treatment.



**Graph 1. Post comparison of vitals of morning sessions of Group A vs Group B**

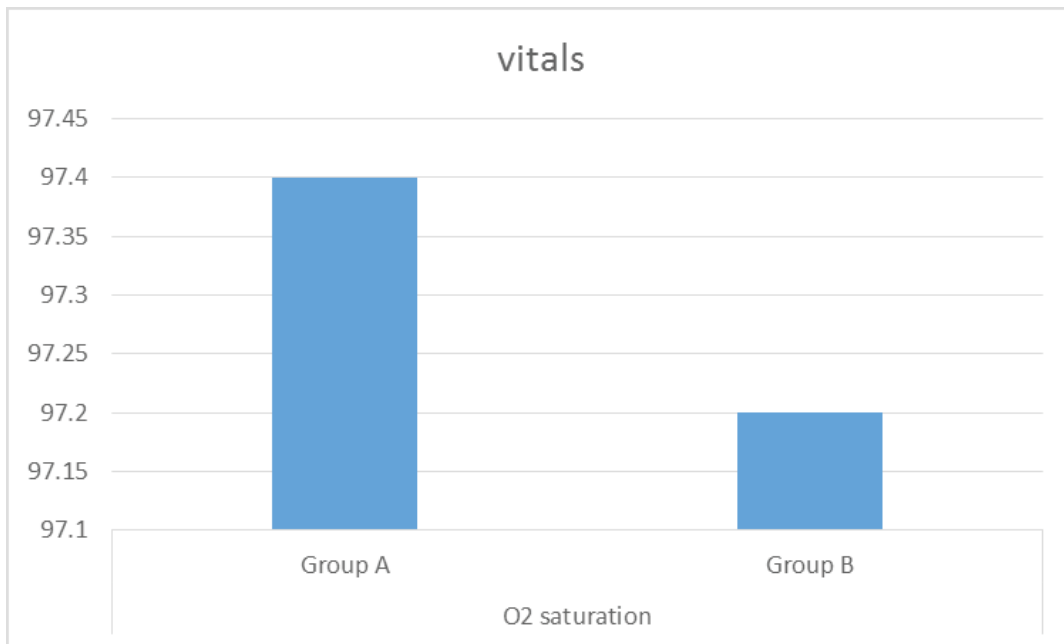


**Graph 2. Post comparison of FEV of morning sessions of Group A vs Group B**

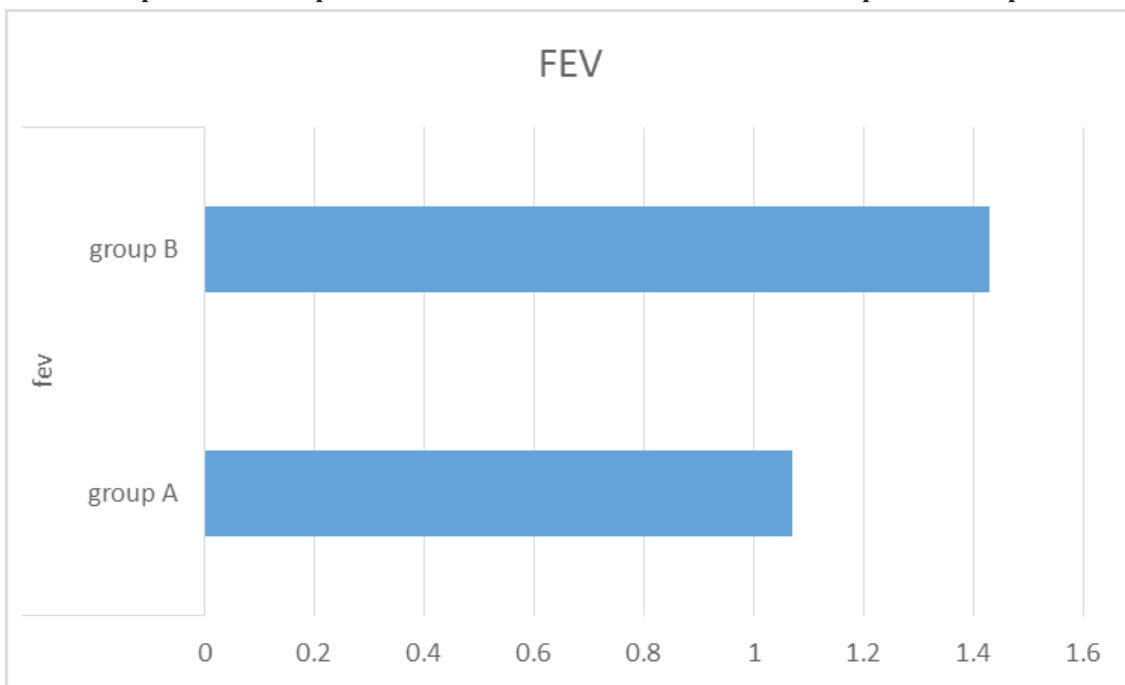
Table 2 shows comparison between the post treatments of morning sessions as well as afternoon sessions respectively.

It also shows that there is significant difference is present between two groups for O2 saturation and in peak flow meter measurement but there is equal for MMRC grades.

So overall it shows that there group A have more effect than group B.



**Graph 3. Post comparison of vitals of afternoon sessions of Group A vs Group B**



**Graph 4. Post comparison of FEV of afternoon sessions of Group A vs Group B**

**Table 1. Group A (segmental relaxation + postural drainage + forced expiratory technique) and Group B (postural drainage + forced expiratory technique)**

			Mean ± SD		Paired 't' value	P value
			Pre	Post		
	Vitals O2 saturation	Morning	96.5 ± 1.225	98.1 ± 0.917	6.904	< 0.0001
		Afternoon	96.7 ± 1.139	97.4 ± 0.829	6.817	< 0.0001
Group A	Peak flow meter FEV	Morning	2.07 ± 0.27	1.14 ± 0.363	13.000	< 0.0001
		Afternoon	2.00 ± 0.39	1.07 ± 0.27	7.320	< 0.0001
	MMRC grades	Morning	3.71 ± 0.47	2.93 ± 0.475	6.904	< 0.0001
		Afternoon	3.43 ± 0.51	2.43 ± 0.51	9.539	< 0.0001
	Vitals O2 saturation	Morning	96.6 ± 1.555	97.4 ± 1.151	3.667	0.0028
		Afternoon	96.6 ± 1.136	97.2 ± 1.122	3.309	0.0057
Group B	Peak flow meter FEV	Morning	2.14 ± 0.363	1.29 ± 0.469	8.832	< 0.0001
		Afternoon	2 ± 0.392	1.43 ± 0.514	4.163	0.0011
	MMRC grades	Morning	3.71 ± 0.469	2.71 ± 0.611	9.539	< 0.0001
		Afternoon	3.64 ± 0.497	2.57 ± 0.514	15.000	< 0.0001

**Table 2. Post comparison of morning and afternoon sessions of Group A vs Group B**

sessions			Mean	SD	Unpaired t test	P value
	O2 saturation	Group A	98.1	0.917	1.816	0.0404
		Group B	97.4	1.151		
Morning	FEV	Group A	1.14	0.363	0.9014	0.1878
		Group B	1.29	0.469		
	MMRC	Group A	2.71	0.475	1.036	0.1549
		Group B	2.93	0.611		
	O2 saturation	Group A	97.4	0.829	2.300	0.0149
		Group B	97.2	1.122		

**Cont... Table 2. Post comparison of morning and afternoon sessions of Group A vs Group B**

Afternoon	FEV	Group A	1.07	0.267	2.308	0.0146
		Group B	1.43	0.514		
	MMRC	Group A	2.43	0.514	0.7360	0.2342
		Group B	2.57	0.514		

## Discussion

This research aimed to study the effectiveness of postural drainage and forced expiratory technique along with segmental relaxation technique on airway clearance in chronic obstructive pulmonary disease patients. Evidences suggests that postural drainage and forced expiratory technique is effective treatment for the airway clearance.

The signs and symptoms of COPD infrequent shortness of breath particularly after exercise, long lasting periodic cough, mucus production and are wheezing, weight loss, chronic dyspnea, cough and sputum, chest tightness, anxiety secondary to dyspnea.

To cure this condition treatment is necessary. In this study to assess the lung capacity O<sub>2</sub> saturation, peak flow meter and MMRC grades were used. From these outcome measures we can see the lung capacity and can also interpreted the severity of the condition. So if these condition left untreated then this inflammation leads to repeated cycles of injury and repair of the airway wall<sup>14</sup>.

Subjects were selected for the study according to the selection criteria. Demographic data and consent form was taken from them. Included participants was divided into two groups by random sampling method. Pre and post assessment was taken before and after the treatment respectively with the help of outcome measures.

This is a study of segmental relaxation from Laura Mitchell Relaxation Techniques followed by postural drainage and forced expiratory techniques in COPD patients. The study was conducting in and around Karad.

The subjects were divided in 2 groups: group 1 is experimental group while group 2 is control group. In experimental group we would give segmental

relaxation followed by postural drainage and forced expiratory technique. And in control group we should give segmental relaxation along with forced expiratory technique.

First, therapist should tell all procedure which are performed on them and then they should have to follow their commands for segmental relaxation technique.

Patient should be in supine position. Asked them to concentrate on their breathing then give orders for shoulders that pull their shoulders towards feet and feel that position and slowly relax; followed by give orders to body that press your body into the support and again feel the pressure of your body on the support and slowly relax. And last order for the breathing i.e. take a deep breath; feel your tummy swell out your breath out then breath out easily repeat this twice.

After this relaxation technique, postural drainage should be given by therapist. Followed by postural drainage, forced expiratory technique should be given to remove those secretions which were loosen and dislodge by segmental relaxation along with postural drainage.

The experimental results were statistically analysed. The significant difference between the two groups was investigated with the unpaired t test and within the group with paired t test.

In this study treatment protocol included segmental relaxation, postural drainage and forced expiratory technique. This segmental relaxation from Laura Mitchell's Relaxation technique, principles of this technique are 1. Tightening or contracting muscles results in movement 2. Movement causes reposition of the joints and limbs 3. when we are awake, the brain will register a change in body position through muscle,

joint and skin sensation. 4. The brain is only aware of the movement it causes. Movements are controlled by the nervous system; if one group of muscles is instructed to tighten, the opposite group of muscles for that action receives an instruction to relax.<sup>15</sup>

Followed by postural drainage, in that position and chest manipulation (percussion, vibration and shaking) are required to dislodge the secretions and pass on to central airways and to remove the secretions throw-out the body. Coughing and huffing combining both termed as forced expiratory technique.<sup>16</sup> previous study suggest that postural drainage is most effective treatment for hypersecretion. And for eliminating these secretion coughing is most helpful treatment as shown in previous study.<sup>16</sup>

As compared to previous study and as shown in graph treatment with segmental relaxation gives speedy recovery for mucus clearance.

### Conclusion

In that postural drainage and forced expiratory technique has less effect than these techniques that is postural drainage and forced expiratory technique along with segmental relaxation from Laura Mitchell Relaxation Technique in COPD patients.

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**Conflict o Interest - Nil**

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**Ethical Clearance:** The Institutional Ethics committee has hereby given permission to initiate the research project titled, “Effectiveness of postural drainage and forced expiratory technique along with segmental relaxation technique on airway clearance in chronic obstructive pulmonary disease patients”.

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