



IMMEDIATE EFFECT OF CHEST MOBILIZATION ON PEAK EXPIRATORY FLOW RATE, CHEST EXPANSION AND DYSPNOEA IN COPD PATIENTS WITH RESTRICTIVE IMPAIRMENT: A PRE AND POST CLINICAL TRIAL

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ABSTRACT

Study design: Experimental study

Background: Chronic obstructive pulmonary disease is a condition in which there is chronic obstruction to airflow due to chronic bronchitis or emphysema. It is a major cause of mortality and morbidity in population on large scale.

Aim: To evaluate immediate effect of chest mobilization on peak expiratory flow rate, chest expansion and dyspnoea.

Method: 30 subjects include both male and female between age 40 to 60 years were recruited in the study. Demographic data was taken from the subjects. Subjects were given chest mobilization for 10 minutes and its pre and post intervention effects were noted on, peak flow rate, chest expansion and dyspnoea.

Result: Pre-test and Post-test scores of peak flow rate and dyspnoea showed statistically significant where p value less than 0.5 but chest measurement did not show any significant results.

Conclusion: Present study concluded that chest wall mobilization has significant effect on peak expiratory flow rate, chest expansion and dyspnoea in COPD patients with restrictive impairment.

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INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a condition in which there is chronic obstruction to airflow due to chronic bronchitis or emphysema. It is characterized by generalized airflow obstruction, the major site of obstruction being the small airways. Cigarette smoke produces high concentration of oxygen free radicals (reactive oxygen species) which are responsible for tissue damage and activation of neutrophils and eosinophils. Inflammatory response is initiated through the activation of transcription factors {NK-kb} and activator protein {API} and gene expression of proinflammatory mediators¹. COPD is a common preventable and treatable disease, with an enhanced chronic inflammatory response to noxious particles or gases². It is a major cause of mortality and morbidity in population on large scale³. COPD is not a simply a smoker cough but under diagnose life threatening lung diseases. Chronic obstructive pulmonary diseases have a complex pathophysiological in various components including mucociliary dysfunction, inflammation of airway and changes in central airways and peripheral airways, lung parenchyma

and pulmonary vasculature⁴. COPD is a leading cause of death in western countries⁵. This causes hypersecretion (chronic bronchitis), tissue destruction (emphysema) and destruction of normal repair and defence mechanism causing inflammation of airway and fibrosis⁶. Peak expiratory flow is a person's maximum speed of expiration with maximal force starting from the level of maximal lung inflation⁷. Peak expiratory flow rate is strongly related to age, smoking and year's smoked⁸. Failure to take deep periodic deep breaths change in alveolar surface forces and tendency for alveolar collapse there is gross muscle weakness due to which chest walls are weak and stiff, Expiratory airflow is limited because of obstruction leading to air trapping and hyperinflation⁹. Patients with COPD have respiratory muscle weakness along with reduction in lung volume and vital capacity in addition to decrease in compliance¹⁰. The dysfunctions cause's restrictions in either inhalation or exhalation and are associated with increased tone of the intercostals muscles between the ribs there is a significant increase in oxygen cost associated with external chest wall restrictions, which is directly related to the level of chest wall restriction.¹¹ Hence the present study is undertaken to evaluate the immediate effect of chest mobilization on peak expiratory flow rate, chest expansion and dyspnoea in COPD patients.

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METHODS

Study was approved by institutional review committee and was concluded in conformity with the principles outlined in declaration of Helsinki.

Participants

Participants were recruited from the tertiary care hospital at Belagavi. 30 participants of both genders were included. The inclusion criteria were: mild to moderate COPD patients (according to GOLD criteria) of COPD, middle age subjects between 40 to 60 years. The exclusion criteria included: musculoskeletal disorders, cardiovascular dysfunction, recent chest injuries, patients with unstable vital parameters, lung infection. After meeting the inclusion and exclusion criteria patients were recruited in the study.

Intervention

Each patient included in the study received chest mobilization techniques which included: rib rotation, chest wall rotation, lateral flexion of chest wall and chest wall extension. Chest expansion values were measured before and after giving chest mobilization technique. 3 repetitions of each technique were done. Dyspnoea was measured using modified Borg's dyspnoea scale.



Fig chest wall extension



Fig rib rotation



Fig lateral flexion of chest wall



Fig chest wall rotation

RESULT

Demographic data that is mean height, mean weight and mean age. Table 2 shows comparison of pre and post peak expiratory flow rate scores was done by wilcoxon matched pair test whereas pre test mean was 216.83 and post test mean was 186.83 and p value was 0.0001 which was statistically significant. Table 3 shows comparison of pre and post measurement scores by wilcoxon matched pair test whereas pre test mean 92.70 and post-test mean 92.97 whereas nipple level shows no significant change in scores and xiphisternum level pre mean 93.17 and post test mean 93.20 which shows statically significant. Table 6 shows comparison of pre test and post test dyspnoea scores whereas pre test mean 5.83 and post test mean 4.97 which shows statistically significant.

Table 1 Comparison of male and females with mean age and BMI by t test

Gender	Age in yrs		Height		Weight		BMI	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Male	49.62	10.75	159.29	5.25	65.48	9.12	25.82	3.46
Female	45.00	12.09	155.78	5.14	61.33	3.84	25.30	1.54
Total	48.23	11.17	158.23	5.39	64.23	8.08	25.66	2.99
t-value	1.0398		1.6858		1.3030		0.4335	
p-value	0.3073		0.1030		0.2032		0.6680	

Table 2 Comparison of pre test and post test peak expiratory flow scores by wilcoxon matched pairs test.

Time	Mean	Std.Dv.	Mean Diff.	SD Diff.	% of change	Z-value	p-value
Pretest	216.83	106.99					
Posttest	186.83	86.83	30.00	39.17	13.84	4.2857	0.0001*

*p<0.05

Table 3 Comparison of pre test and post test axiliary scores by Wilcoxon matched pairs test

Time	Mean	Std.Dv.	Mean Diff.	SD Diff.	% of change	Z-value	p-value
Pretest	92.70	7.35					
Posttest	92.97	7.42	-0.27	0.45	-0.29	2.5205	0.0117*

*p<0.05

Table 4 Comparison of pretest and posttest nipple scores by Wilcoxon matched pairs test

Time	Mean	Std.Dv.	Mean Diff.	SD Diff.	% of change	Z-value	p-value
Pretest	93.37	8.29					
Posttest	93.50	8.43	-0.13	0.35	-0.14	1.8257	0.0679

Table 5 Comparison of pre test and post test xiphisternum scores by Wilcoxon matched pairs test

Time	Mean	Std.Dv.	Mean Diff.	SD Diff.	% of change	Z-value	p-value
Pretest	93.17	8.37					
Posttest	93.20	8.39	-0.03	0.18	-0.04	0.0001	1.0000

Table 6 Comparison of pre test and post test dyspnoea scores by paired t test

Time	Mean	Std.Dv.	Mean Diff.	SD Diff.	% of change	Paired t	p-value
Pretest	5.83	1.23					
Posttest	4.97	1.13	0.87	0.97	14.86	4.8776	0.0001*

DISCUSSION

In the present study shows that there is significant improvement in the peak expiratory flow rate but there was minimal changes seen in chest expansion and there was significant changes seen in dyspnoea episodes which show statistically significant.

Isnamya silvinnerarayolimma studied the effects of chest and neck mobilization on spirometric parameters in healthy subjects they conducted a observational, quantitative and experimental study in a healthy subjects and evaluated spirometric parameters before and after mobilization technique they found forced vital capacity, forced expiratory volume and peak expiratory flow increase after mobilization.¹²

Michael.t. Putt *et al* studied the muscle stretching technique increases vital capacity and range of motion in patients with COPD. They conducted a study on fourteen stable patients with COPD completed a pulmonary rehabilitation were enrolled with 10 patients completing the study they found that hold relax technique to the pectorals muscle compared with sham technique produced significant effect on vital capacity and right and left upper limb range of motion.¹³

Donrawee leelarungrayub *et al*, studied the acute clinical benefits of chest wall stretching exercises on expired tidal volume, dyspnoea and chest expansion in a patients with COPD. They give exercises to patient as a regular daily program along with postural drainage, percussion, breathing exercises and limb exercise. They evaluated efficiency was analyzed during chest physical therapy compare pre and post chest physical therapy with bloom table. They found a significant clinical improvement of expired tidal volume,

reduction in dyspnoea level and increase chest expansion¹⁴. Dharmesh, Parmar studied the immediate effect of chest mobilization technique on dyspnoea in patients of COPD with restrictive impairment. Experimental studied was conducted on 30 COPD patients having vital capacity less than 80% to assess the pre and post differences chest level by applying chest mobilization technique they found significant change in chest expansion.¹⁵

Rafaela barros de sa, *et al* studied immediate effects of respiratory muscle stretching on chest wall kinematics and electromyography activity in COPD patients. They conducted a study of 28 people with COPD and randomized in groups 14 treatment group and 14 to control group then they found result use of stretching to improve COPD chest wall mobility with positivity effect on chest wall mechanics and electromyography.¹⁶

CONCLUSION

Present study concluded that chest mobilization showed statistically significant improvement in Peak expiratory flow rate in patients with COPD where as minimal improvement was seen in chest expansion and Dyspnoea.

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Conflict of interest: none

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