

Effects Of Chest Wall Mobilization Exercises To Improve The Respiratory Functions In Severe Copd Patients

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ABSTRACT

BACKGROUND: COPD is defined by persistent air-flow limitation that is progressive in nature. In most of the patients, the reduced elastic recoil of the lungs with expiratory flow limitation cause hyperinflation of the lungs beyond the resting functional residual capacity. Chest wall mobilization exercises are used to expand the chest during both phases of respiration. It is an active exercise performed by the patient himself. In this study we evaluated the effects of chest wall mobilization exercises to improve the respiratory functions in severe COPD patients.

MATERIALS AND METHODOLOGY: The study was performed at Department of Physiotherapy Revathi Institute of Physiotherapy Tirupur TamilNadu India. Forty male severe COPD patients of age group 55-65 were recruited for the study. Chest wall expansion was measured prior to the exercise program and the post test measurements were taken after 4 weeks of chest wall mobilization exercises. Statistical analysis was done using SPSS and the Wilcoxon Signed Rank test was used to find out the difference within the subjects.

RESULTS: The current study was designed to find out the effects of chest wall mobilization exercises to improve the respiratory function in severe COPD patients. The results showed that there was significant improvement in chest wall expansion in post treatment sessions as compared to pre treatment sessions. Previous studies proved that chest function declined when the disease progresses.

CONCLUSION: In summary the chest wall mobilization exercises found to produce significant changes in respiratory functions in severe COPD patients.

Keywords: COPD, GOLD, Chest wall expansion, Physiotherapy... ..

1. INTRODUCTION

COPD is defined by persistent air-flow limitation that is progressive in nature. In most of the patients, the reduced elastic recoil of the lungs with expiratory flow limitation cause hyperinflation of the lungs beyond the resting functional residual capacity. In the advanced stages of the disease, the pulmonary function test parameter such as increased total lung capacity, increased functional residual capacity and increased residual volume are clearly observed and reflects lung hyperinflation.

Dynamic hyperinflation leads to decreased pressure generating capacity of the inspiratory muscles and it restricts maximum tidal volume leads to reduced exercise tolerance in COPD patients. The reasons for exercise tolerance in COPD patients are complex and multi-factors are involved.

Aliverti et al stated that patients without hyperinflation had lower exercise tolerance as compared to patients who had hyperinflated chest. The lack of chest wall mobility and abdominal wall mobility leads to increased end-inspiratory chest and abdominal volumes during exercise training causes reduced exercise tolerance in severe COPD patients.

The available research studies have reported a decrease in chest wall mobility with aging and also due to severity of the disease. Even though associations between chest wall mobility, lung function and exercise endurance have been reported in

ankylosing spondylitis patients but there are limited data available in severe COPD patients

Chest wall expansion was assessed by taking the chest wall circumference using inch tape at three levels- at the axillary level, at the 4th intercostal space level and at the xiphi-sternum level. It is a simple and inexpensive method during assessment of COPD patients.

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2. MATERIALS AND METHODS:

The study was performed at Department of Physiotherapy Revathi Institute of Physiotherapy Tirupur TamilNadu India. Forty male severe COPD patients of age group 55-65 were recruited for the study. They had been diagnosed based on the Global Initiative for Chronic Obstructive Lung Disease (GOLD) guidelines. Severe COPD patients based on Stage IV GOLD criteria with no acute exacerbations and stable were selected. Patients with history of acute exacerbations, kyphosis, scoliosis, ankylosing spondylitis were excluded from the study. The study was approved by the Institutional Ethical Committee of Revathi Institute of Physiotherapy.

Chest wall expansion was measured prior to the exercise program and the post test measurements were taken after 4 weeks of chest wall mobilization exercises. Statistical analysis was done using SPSS and the Wilcoxon Signed Rank test was used to find out the difference within the subjects.

3. CHEST WALL MOBILIZATION EXERCISES:

With the patient in sitting or standing position, he/she was instructed to breathe in while elevating both arms up and hold his/her breath for 2–3 seconds, then ask the patient to expire and ask his/her arms down. Then, ask the patient to adduct the shoulder, the patient took a deep breath in, held it for 2–3 seconds, and then ask the patient to exhale. Finally, the patient was asked to breathe in deeply while elevating one shoulder, hold for 2–3 seconds, and ask the patient to exhale while lowering one shoulder, then the second. These exercises should be repeated for five times per session for twice a day lasting about 5-10 minutes and for four weeks. Additionally the patients were asked to do diaphragmatic breathing exercises before and after the chest wall mobilization exercises to improve the tidal volume.

4. CHEST WALL MEASUREMENT:

With the patient in sitting position, the physiotherapist measures the chest wall expansion by placing a inch tape at the axillary level, at the 4th intercostals level and at the xiphi-sternum level. The physiotherapist asks the patient to exhale fully and the therapist encircles the inch tape around the patients and should note down the resting value in centimeters. Then the therapist asks the patient to inhale deeply as much as possible and the therapist measures the chest expansion in fully expanded position. Measurements should be taken three times and the best of three should be noted.

5. STATISTICAL ANALYSIS:

Chest wall expansion was measured prior to the exercise program and the post test measurements were taken after 4 weeks of chest wall mobilization exercises. Statistical analysis was done using IBM SPSS statistics for Windows and the dependent t test was used to find out the difference within the subjects.

6. RESULTS:

Table 1-Demographic variables

Characteristics	Mean
Age	60.1

Table 2-Wilcoxon Signed Rank Results (level of significance 0.05)

W value	68.5
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Mean Difference	1.68
Sum of positive ranks	68.5
Sum of negative ranks	672.5
Z-value	4.3797
Mean	370.5
Standard deviation	68.5

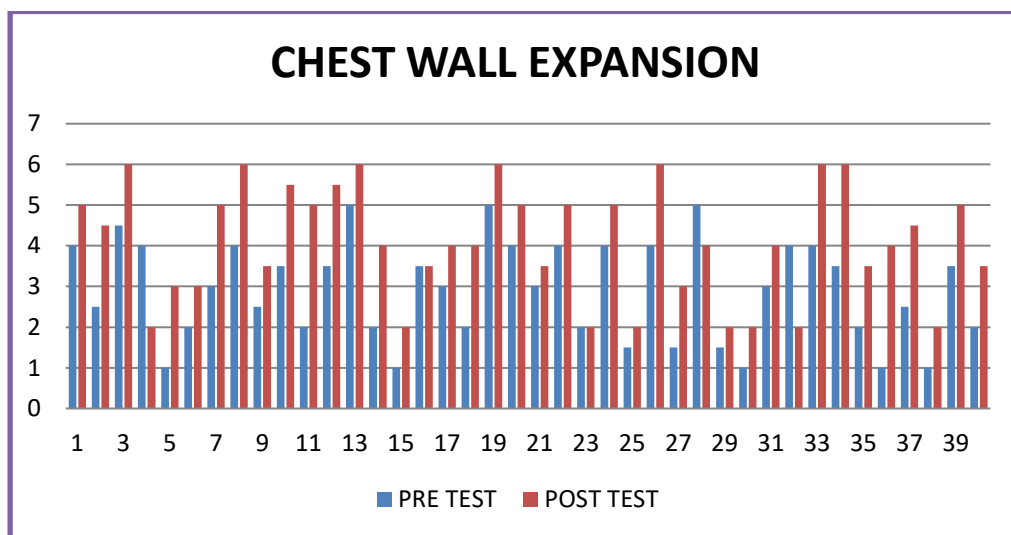


Figure 1- Chest wall Expansion in centimeters

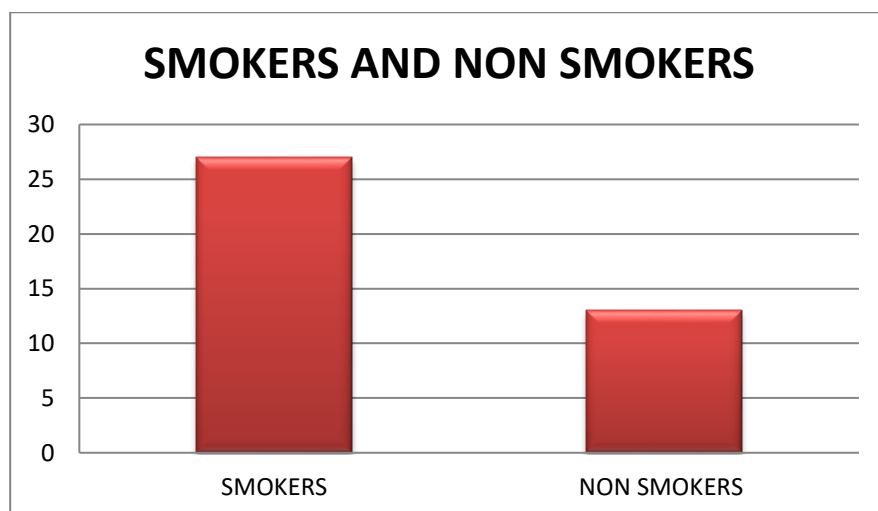


Figure 2- Smokers and Non-smokers

7. DISCUSSION:

The current study was designed to find out the effects of chest wall mobilization exercises to improve the respiratory function in severe COPD patients. The results showed that there was significant improvement in chest wall expansion in post treatment sessions as compared to pre treatment sessions. Previous studies proved that chest function declined when the disease progresses. Our study is in line with these previous studies, and our results demonstrated a high prevalence of reduced mobility in the upper and lower chest regions of the male subjects with severe COPD, in particular, those with GOLD stage IV COPD. Significant improvements were noted in thoracic expansion and may be attributed to a reduction in the muscle tension of the rib cage and an increase in the mechanical properties due to the rib cage movement.

Decreased muscle tension contributes to increasing airflow during inspiration. Moreover, the thorax has an elastic recoil mechanism that contracts and relaxes during breathing, and the expansion of the lungs is affected by the capacity of the thorax, which is augmented by the increased elasticity of the skeletal muscle and surrounding soft tissue. Our study is in line with Debouche et al. and they found that lower chest expansion had a stronger correlation with decreased respiratory function in severe COPD patients.

Chest expansion seems to be different and uneven within healthy and diseased subjects, ranging from 4–7 cm in healthy subjects. In our study the mean of the chest expansion was 1.19 and our mean values were found to be significant as compared to the study by Carla Malaguti et al 2009.

Based on the findings, the chest wall mobilization exercises improved the respiratory functions in severe COPD patients.

8. LIMITATIONS:

The lack of control group was a de merit of this study.

9. CONCLUSION:

In summary the chest wall mobilization exercises found to produce significant changes in respiratory functions in severe COPD patients.

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