A Comparative on the Effects of Thoracic Squeeze Technique Versus Manual Diaphragm Release Technique on Sputum Clearance among Patient with Chronic Obstructive Pulmonary Disease

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Abstract

Background: The COPD, a prevalent and manageable condition, leads to diminished airflow and tissue damage. It is associated with structural lung problems caused by prolonged inflammation due to continuous exposure to harmful particles or gases, particularly from cigarette smoke.

Purpose: To compare the effectiveness of thoracic squeeze technique and manual diaphragm release technique on sputum clearance among patient with COPD.

Materials and Methods: A total of 30 participants were selected according to inclusion and exclusion criteria were deliberately sampled. Group A (n=15) received thoracic squeeze technique and the Group B (n=15) received manual diaphragm release technique. All individuals were assessed for COPD assessment test as a pre-test prior to the intervention and again after 6 weeks of intervention. The entire process was performed from November 2022 to April 2023.

Result: Statistical analysis was done for all the collected data using paired t-tests. The test shows significant effects (p<0.0001) in both groups. The test shows that the subjects receiving thoracic squeeze technique have improved sputum clearance among patients with COPD.

Conclusion: The results and the data obtained from this research was statistically significant and concluded that there was a definite and positive effect of thoracic squeeze technique on sputum clearance. This can be recommended in Pulmonary Physiotherapy Practise.

Key Words: COPD, COPD Assessment Test, Thoracic Squeeze Technique, Manual Diaphragm Release Technique.

Introduction

COPD, a prevalent and manageable condition, leads to diminished airflow and tissue damage. It is associated with structural lung problems caused by prolonged inflammation due to continuous exposure to harmful particles or gases, particularly from cigarette smoke. It can happen to have signs that range from asymptomatic to respiratory failure.
Chronic inflammation reduces pulmonary recoil and contracts the airways. Coughing, dyspnea, and sputum production are common symptoms. Emphysema, a structural abnormality observed in COPD, is characterized by the damage of the alveolar air sacs, the lungs’ surfaces responsible for gas exchange, resulting in obstructive physiology. The inflammatory response in emphysema is triggered by irritants like smoking.\(^2\)

The squeezing technique, alternatively referred to as manually assisted coughing, is a beneficial physiotherapy method that involves applying manual pressure to the thorax during exhalation, followed by releasing it at the end. This technique aids in the mobilization of pulmonary secretions, facilitates active inhalation, and enhances airflow within the alveoli. Activate the common cough mechanism. This technique involves placing your hands on the bottom one-third of your chest.\(^3\)

The Manual Diaphragm Release Technique (MDRT) is a therapy aimed at directly stretching the muscle fibers of the diaphragm. Despite its widespread use in various treatment settings, there is a lack of comprehensive evaluation regarding the effectiveness of the MDRT. Therefore, the aim of this study was to evaluate the influence of the MDRT on respiratory performance in individuals diagnosed with COPD.\(^4\)

It has the potential to improve chest wall flexibility and thoracic excursion, leading to enhanced exercise capacity and lung function. Evidence has shown that performing stretching exercises on the respiratory muscles can enhance ventilation in individuals with COPD. This is achieved by improving the ability of the chest wall to expand and accommodate greater airflow.\(^5\)

The practice of stretching the respiratory muscles brings about positive effects on vital capacity, chest wall mobility, and alleviation of dyspnea, resulting in the reduction of COPD-related consequences.\(^6\)

**Aim**

To compare the effectiveness of the thoracic squeeze technique and manual diaphragm release technique in promoting sputum clearance in patients with chronic obstructive lung disease.

**Materials and Methods**

30 participants with chronic obstructive pulmonary disease were recruited based on the inclusion and exclusion criteria, and informed consent was obtained from the subjects. The subjects were made aware of the study’s safety and simplicity. Individuals were randomized to one of two groups at random: group A (15 subjects) got thoracic squeeze method and group B (15 subjects) received manual diaphragm release technique. All participants underwent a COPD assessment test (CAT) as a pre-test prior to the intervention and again after 6 weeks from November 2022 to April 2023.

**Inclusion criteria:**
- Subjects who have been diagnosed with (COPD)
- Age between 40 - 60 years.
- Both male and female.

**Exclusion criteria:**
- Asthma.
- Lung cancer, pulmonary fibrosis, bronchiectasis.
- Respiratory infections such as Pneumonia, Bronchitis
- Heart failure or end stage renal failure

**Outcome Measures:**

COPD Assessment Test:

The COPD Assessment Test (CAT) is a self-administered questionnaire designed to assess the impact of chronic obstructive pulmonary disease (COPD) on an individual’s health status. It provides a standardized way to measure the overall health and well-being of COPD patients.

**Procedure**

For this study, 30 participants meeting the inclusion and exclusion criteria were deliberately sampled. The individuals were randomly assigned to one of two groups: Group A (n=15) received thoracic squeeze technique and the Group B (n=15) received manual diaphragm release technique. All individuals were assessed for COPD assessment test as a pre-test prior to the intervention and again after 6 weeks of intervention.
**Group A Thoracic Squeeze Technique:**

Applying thoracic squeeze technique for chronic obstructive pulmonary disease involves a specific technique to ensure optimal treatment delivery. Here is a step-by-step guide on how to apply thoracic squeeze technique for COPD.

Have the patient sit upright on a chair or bed, with their feet flat on the floor. Position yourself behind the patient, standing or sitting. Place your hands on either side of the patient’s ribcage, just below the armpits. Ask the patient to take a deep breath in. As the patient begins to exhale, gently apply pressure with your hands, squeezing the rib cage together. Maintain the pressure for a few seconds, allowing the patient to continue exhaling. Release the pressure as the patient starts to inhale again.

**Treatment Duration:**

This technique is performed for about 10 to 15 minutes per session, and multiple sessions may be done throughout the day.

**Group B Manual Diaphragm Release Technique:**

Manual diaphragm release therapy is employed as a therapeutic intervention for individuals diagnosed with chronic obstructive pulmonary disease (COPD). This treatment involves employing precise breathing techniques customized to aid in the movement and elimination of mucus from the respiratory pathways. The instructions presented below offer a detailed visual guide on the proper implementation of the manual diaphragm release technique for patients diagnosed with COPD.

**Diaphragm Release:**

With your hand on the upper part of your abdomen, gently apply light pressure upward towards your ribcage. You should feel a slight resistance from your diaphragm.

As you exhale, encourage your diaphragm to relax and release tension by applying gentle upward pressure with your hand.

Avoid excessive force or discomfort.

As you inhale, allow your diaphragm to naturally descend and expand against the pressure of your hand.

Repeat this process for several breaths, gradually releasing any tension or tightness you may feel in the diaphragm.

**Treatment Duration:**

Administer manual diaphragm release technique for the recommended treatment duration, typically ranging from a few minutes to several minutes per session.

**Data Analysis**

Fig-1: Comparison between pre and post-test values of COPD Assessment Test (CAT) Group A: Thoracic Squeeze Technique on sputum clearance

Fig-2: Comparison between Pre-test and Post-test values of COPD Assessment test Group B: Manual diaphragm release technique on sputum clearance

Fig-3: Comparison of post-test values in both the Groups using COPD Assessment Test.
Result

After statistical analysis A considerable distinction between the outcomes of the pre- and post-tests was found in the quantitative data. The test shows that the subjects receiving Thoracic squeeze technique have improved sputum clearance among chronic obstructive pulmonary disease patients.

Comparison of post-test of Group A and Group B revealed that the mean value of COPD Assessment Test (CAT) was 22.40 in pre-test and post-test was 25.07. SD Value of COPD Assessment Test (CAT) was 3.31 in pre-test and post-test was 3.37. T value 2.185 P value.

Discussion

COPD can affect people of all ages; it is more prevalent among older individuals. The risk of developing COPD increases with age, and the majority of cases are diagnosed in individuals over the age of 40. COPD often results from extended exposure to irritants like cigarette smoke, air pollution, and workplace hazards, without experiencing an episode for the preceding six weeks. It is often associated with a combination of two primary conditions: chronic bronchitis and emphysema.

The purpose of the study was to find the effectiveness of thoracic squeeze technique and manual diaphragm release technique on sputum clearance among patients with COPD. Research studies also stated that thoracic squeeze technique has significant improvements in patients with COPD.

Fink et al. (2003) identified the Thoracic Squeeze Technique (TST) as one of the techniques. It is also a new and successful physiotherapy practice that may be used safely on non-hospitalized patients. TST is a sophisticated technique that entails gently continuous chest compressions followed by complete release.

Gonzalez-Alvarez FJ et al (2020) The diaphragm stretch technique was employed to quantify rib cage and abdominal excursion in healthy volunteers, and a significant increase at the xiphoid level was identified. Yelvar YDG used the Redoming of diaphragm technique to investigate the immediate effects of manual therapy on inspiratory muscle strength and respiratory functions in patients with known COPD but no current or ongoing exacerbation, which resulted in improved pulmonary function and inspiratory muscle strength.

Rocha et al (2005) Manual diaphragm release technique improved diaphragmatic mobility, 6-minute walking distance, and inspiratory capacity in people with clinically stable COPD.

Conclusion

The results and the data obtained from this research was statistically classified and can be concluded that there was a definite and positive effect of thoracic squeeze technique on sputum clearance. This can be recommended into Pulmonary Physiotherapy Practise.

Ethical Clearance: This research has been approved by the ISRB ethical committee. ISRB NUMBER:03/003/2022/ISRB/SR/SCPT.

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References


