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EFFECT OF MUSCLE ENERGY TECHNIQUE (MET) OF ACCESSORY INSPIRATORY MUSCLE ON PULMONARY FUNCTION AND FUNCTIONAL EXERCISE CAPACITY IN PATIENT WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE (COPD) – AN EXPERIMENTAL STUDY

Physiotherapy

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ABSTRACT

METs are a type of manual therapy designed to improve joints mobility, stretching tense muscles and fascia, improving blood circulation and relieving pain. Thus, the present study was designed to compare the effectiveness of MET with that of traditional Conventional Chest Physiotherapy (CPT) in restoring lung function and overall functional ability in patients suffering from COPD. 34 patients having COPD had enrolled as subjects and were randomized into 2 groups: Group A received both MET and CPT, and Group B received CPT alone. The intervention was done for three weeks for both groups. Pre-intervention and post-intervention pulmonary function tests such as FEV1, FVC, FEV1/FVC, PEFR, chest expansion, and Six-Minute Walk Test (6MWT) were carried out for outcome measures. Group A had a statistically greater improvement compared with Group B for all the measured outcomes. Improvement in lung function, chest expansion, and walking distance were noted in the group receiving MET plus CPT.Thus, it may be concluded that MET along with conventional chest physiotherapy is an effective procedure for enhancing lung function and improving physical agility in patients with COPD.

KEYWORDS

COPD, Muscle Energy Technique, Pulmonary Rehabilitation, Chest Expansion, Breathing Exercises

INTRODUCTION

Chronic Obstructive Pulmonary Disease is a progressive lung condition characterized by persistent airflow obstruction, which leads to a significant decline in pulmonary function and exercise tolerance (Agustí et al., 2023). COPD results from chronic inflammation and structural lung damage, particularly affecting the airways and alveoli, contributing to the dysfunction of respiratory muscles and the overall mechanical integrity of the thoracic cage. As the disease progresses, patients often develop hyperinflation, postural abnormalities, and overuse of accessory muscles of respiration, including the sternocleidomastoid and scalene muscles, which contribute to thoracic stiffness and dyspnea (Sarkar et al., 2019).

The management of COPD has traditionally focused on reducing inflammation, improving pulmonary function, and increasing exercise tolerance through pharmacotherapy and pulmonary rehabilitation, there is a growing recognition that musculoskeletal and biomechanical impairments also play a significant role in the disease's progression. Specifically, the dysfunction of the accessory inspiratory muscles and the mechanical alterations in the chest wall (e.g., barrel chest, kyphosis) limit both respiratory function and the ability to perform activities of daily living (Sevasta et al., 2023). However, the impact of musculoskeletal therapy, particularly manual techniques like Muscle Energy Technique , on improving these mechanical issues in COPD remains underexplored.

MET, a form of manual therapy developed by Fred Mitchell, Sr., is commonly used to treat musculoskeletal conditions by leveraging the patient's own muscle contractions to enhance muscle length and joint mobility (Baxter et al., 2019). The technique is founded on the principles of autogenic inhibition and reciprocal inhibition, which are mediated by the activation of Golgi Tendon Organs to relax the target muscles (Waxenbaum et al., 2025). In the context of COPD, MET is particularly promising for addressing the overactivity of the accessory respiratory muscles and alleviating the thoracic wall stiffness that often accompanies the disease (Sevasta et al., 2023).

Recent studies have shown that MET can help to improve chest wall mobility, reduce muscle hypertonicity, and enhance respiratory muscle efficiency in individuals with chronic respiratory conditions (Clarke et al., 2023). MET's potential benefits include increased forced expiratory volume in 1 second (FEV1), reduced respiratory rate, and improved oxygen saturation (Sevasta et al., 2023).

Despite the growing interest in MET as a treatment for COPD, the existing body of research remains limited. The present study aims to fill this gap by evaluating the effects of MET on accessory inspiratory muscles in COPD patients, with a particular focus on its impact on pulmonary function, dyspnea, and functional exercise capacity

Aim And Objectives

Aim: To evaluate the effect of Muscle Energy Technique of the accessory inspiratory muscles on Pulmonary function and Functional Capacity in Chronic Obstructive Pulmonary Disease patients.

Objectives:

i. To check the result of pulmonary function test in patient performing Conventional chest physiotherapy with Muscle Energy Technique.
ii. To check the result of Functional Exercise Capacity in patients performing Conventional Chest Physiotherapy with Muscle Energy Technique
iii. To check the result of pulmonary function test in patients performing only Conventional Chest Physiotherapy.
iv. To check the result of Functional Exercise Capacity in patients performing only Conventional Chest Physiotherapy.

MATERIALS AND METHODS

Source Of Data: Pranayam Lung And Heart Institute, Vadodara
Study Design: An Experimental Study.
Study Duration: 10-12 Months
Study Population: Chronic Obstructive Pulmonary Disease Patients.
Sampling Method: Convenient Sampling
Sample Size: 34.

Inclusion Criteria:

1. Male and female subjects diagnosed with COPD
2. Age 30 to 70 years.
3. Voluntary consent to participate.

Exclusion Criteria:

1. Any condition of cardiovascular respiratory system other than COPD.
2. Any neuro-muscular conditions which may affect lung functions.
3. All post-op patients.
4. Metabolic Conditions.
5. Post-operative Pulmonary surgeries.
6. Uncooperative patients

Procedure:

A single blinded experimental study was conducted after obtaining Ethical Committee approval at Krishna School of physiotherapy and Rehabilitation the study included 34 participants, selection was based on inclusion and exclusion criteria. An informed consent was obtained from all the participants after explaining the study procedure . The individuals were randomly assigned into two groups: Group A- Muscle Energy Technique with Conventional Chest physiotherapy .Group- B Conventional Chest Physiotherapy .

The Group A received Muscle Energy Technique in addition to the Conventional chest physiotherapy. Group-B diaphragmatic breathing and Thoracic mobility exercise.

All the subjects were assessed for their outcome measures - Pulmonary function (FEV, FVC and FEV 1/ FVC ratio), 6-minute walk test and chest expansion at 3 levels.The same tests were repeated at the end of 3 week .

Group A – Experimental Group

The experimental group was treated with Muscle Energy Technique of accessory inspiratory muscle and conventional chest physiotherapy. MET was applied to the following muscles: Pectoralis Major and Sternocleidomastoid. This intervention was carried out 3 times per week for a total of 3 weeks.

Fig 1 Post isometric relaxation-contraction

Fig 2 Post isometric relaxation-stretching phase

Fig 3 Post isometric relaxation - contraction phase

Fig 4 Post isometric relaxation - stretching phase

Group B- Control Group

The control group treated with conventional methods diaphragmatic breathing and thoracic mobility. with a frequency of 3 times/week - 10 repetitions/3 set/session/ day (Rekha et al., 2016).

Outcome Measures:

Primary

1. Pulmonary Function Test: FEV1, FVC and FEV1/ FVC ratio
2. Six Minute Walk Test

Secondary :

1. Chest expansion.
2. Peak Expiratory Flow Rate

Statistical Analysis & Result

Descriptive statistical analysis was obtained using frequency, percentage, mean, SD, median. Paired t-test was used for the comparison of Pre and post data within the group. Unpaired t-test was used for the comparison of data between group A and Group B. All the statistical analysis was performed by using Microsoft Excel 365.

Table 1: Data represent Age Distribution Among Group A & B

GROUP	MEAN & SD	T-VALUE	P-VALUE
GROUP A	64.23 ±4.07	0	1
GROUP B	63.88±5.24	0	1

Table 2 : Data represent of gender wise distribution of participants in group A and B

GENDER	GROUP A	GROUP B
MALE	9	11
FEMALE	8	6
TOTAL	17	17

Table 3 Data represents comparison of post-procedure pulmonary function (PFT) of group A and group B

PFT	GROUP A Mean & SD	GROUP B Mean & SD	t-VALUE	p-VALUE
FEV1	1.16±0.13	1.45±0.19	5.24	<.00001
FVC	2.70±0.21	4.51±0.28	20.51	<.00001
FEV1/FVC Ratio	1.54±0.02	0.49±0.02	69.55	<.00001
PEFR	253.23±19.49	251.76±23.51	-0.20	0.41

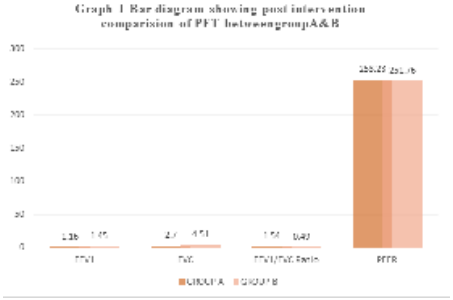


Table 4: Data represents comparison of post-procedure 6MWT of the group A and B

6MWT	GROUP A Mean & SD	GROUP B Mean & SD	t-VALUE	p-VALUE
DISTANCE	365±53.90	335.29±22.39	2.09	.04

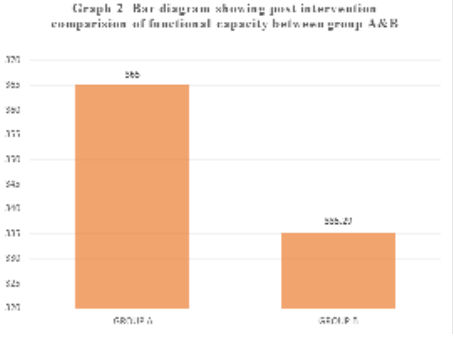
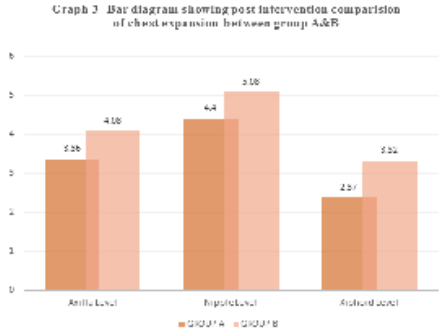


Table 5: Data represents comparison of post-procedure chest expansion of group A and B

Chest Expansion	GROUP A Mean & SD	GROUP B Mean & SD	t-VALUE	p-VALUE
Axilla	3.36±0.21	4.08±0.32	-7.58	<.00001
Nipple	4.40±0.23	5.08±0.32	-6.94	<.00001
Xiphisternumlevel	2.37±0.20	3.32±0.32	-10.14	<.00001



Statistically significant improvements were observed in both groups but more pronounced in group A. There was not significant difference in Peak Expiratory Flow Rate.

DISCUSSION

This study aimed to evaluate the effect of Muscle Energy Technique on pulmonary function, functional exercise capacity, and chest expansion in patients with Chronic Obstructive Pulmonary Disease . A total of 34 patients were recruited and divided into two groups: Group A received MET along with conventional chest physiotherapy, while Group B received CPT alone. Both groups showed statistically significant improvements in pulmonary function, but the improvements were more pronounced in Group A. FEV1 increased notably in Group A (0.99 ± 0.12 to 1.16 ± 0.13) compared to Group B (1.32 ± 0.17 to 1.45 ± 0.19), and a substantial rise in the FEV1/FVC ratio was also observed in Group A. These findings suggest that MET enhances respiratory muscle flexibility, reduces tension in accessory muscles, and improves airflow dynamics. Similarly, Group A showed greater improvements in functional capacity, as evidenced by a higher increase in 6MWT distance. This suggests improved respiratory efficiency and muscle endurance.

Chest expansion was significantly better in Group A across all measurement levels, reflecting improved thoracic mobility and rib cage flexibility due to MET.The technique likely reduced muscle stiffness and enhanced joint movement, contributing to better lung expansion and oxygenation.

The findings align with previous research by Anand et al. (2013), Bains et al. (2022), and Rajandekar et al. (2018), who also reported positive effects of MET on respiratory function, chest wall movement, and exercise tolerance. Overall, the study supports the effectiveness of MET as a complementary therapy in improving outcomes in COPD patients.

CONCLUSION

This study demonstrates that the Muscle Energy Technique with conventional chest physiotherapy leads to significant improvements in pulmonary function, chest expansion, and functional capacity. MET can be considered a valuable addition to the physiotherapy management of COPD.

Limitations

i. Sample Size
ii. Duration of intervention
iii. Settings

Future Scope

Larger and more diverse participant samples and measure long-term effects of MET

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