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# IMMEDIATE EFFECT OF MULLIGAN THERAPY ON RESPIRATORY FUNCTIONS IN PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE.

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**ABSTRACT**

**AIM:** Aim of the study is to see the effect of thoracic joint movement with mobilization in COPD patients and to check its effect on respiratory functions.

**OBJECTIVE:** To assess the pulmonary functions (FEV1, FVC, FEV1/FVC, and PEFR) changes in patients with chronic obstructive pulmonary disease after mulligan therapy.

**PARTICIPANTS AND METHOD:** Thirty patients with severe COPD (eight females and 22 males; mean age 52.4±6.8 years) referred to pulmonary physiotherapy were included in this study. The patients participated in a single session of MT to measure the short-term effects. The lung function was measured using a portable spirometer. All measurements were taken before and immediately after the first MT session.

**Results:** There was a significant improvement in the forced expiratory volume in the first second, forced vital capacity, ratio and peak expiratory flow rate ($p < 0.05$).

**Conclusion:** A single MT session immediately improved pulmonary function in patients with severe COPD. MT should be added to pulmonary rehabilitation treatment as a new alternative that is fast acting and motivating in patients with COPD.

**KEYWORDS :** mulligan therapy, COPD, pulmonary function

## INTRODUCTION

COPD, which decreases the quality of life and increases the risk of early mortality, is a chronic, preventable, and treatable disease. Although the pulmonary system is affected, COPD has a high frequency of extra pulmonary comorbidities that affect cardiovascular and musculoskeletal systems and can lead to malnutrition.[1]

Structural differences in rib cage configuration, forward head posture, shoulder protraction reduced bone mineral density, and an increased prevalence of vertebral deformities have also been reported in COPD.[2,3] Chest wall mechanics are changed and chest wall rigidity occurs in COPD. Hyperinflation and respiratory muscle fatigue produce hypertonicity in respiratory muscles as well as hypo mobility of spinal, costal, and sternal joints that comprise the chest wall. The change in chest wall mechanics may be a factor that causes exercise-limiting dyspnoea in COPD.[4]

A decrease in thoracic spine mobility is correlated with a decrease in forced vital capacity (FVC) and forced expiratory volume in the first second (FEV1). An increase in chest wall rigidity affects the ventilatory pumping mechanism, reducing the level of rigidity (increasing chest wall mobility), and has been suggested as a way to improve lung function.

A previous study on patients with COPD has demonstrated that manual therapy (MT) exercises increase lung function in the short term[5]. Another study showed that osteopathic manipulative treatment yielded a statistically significant decrease immediately in forced expiratory flow at 25% and 50% of vital capacity (VC) and airway resistance in elderly patients[6] . To the best of our knowledge, there is no study that investigated the immediate effect of mulligan therapy on inspiratory muscle strength and patient satisfaction in patients with COPD.

The hypothesis underlying this study was that mulligan that includes both soft tissue and joint mobilization immediately increases pulmonary function, inspiratory muscle strength, and patient satisfaction, and decreases dyspnea perception in patients with COPD.

## NEED OF STUDY

In COPD hyperinflation & respiratory muscle fatigue produce hypertonicity in respiratory muscles as well as hypo mobility of spinal, costal, & sternal joints that comprises the chest wall. Decrease in thoracic spine mobility is correlated with a decreased in forced vital capacity & forced expiratory flow in one second & increase in chest wall rigidity and hence the mulligan has been suggested as a way to improve lung function.

## AIM:

Aim of the study is to see the effect of thoracic joint movement with mobilization in COPD patients and to check its effect on respiratory functions.

## OBJECTIVES:

To assess the pulmonary functions (FEV1, FVC, FEV1/FVC, and PEFR) changes in patients with chronic obstructive pulmonary disease after mulligan therapy.

## METHODOLOGY

The study was conducted in SBB College of physiotherapy, vs hospital, Ahmedabad.Oral inform consent was taken.

## INCLUSION CRITERIA:

COPD patients of grad 2 and 3 according GOLD (Global Initiative for Chronic Obstructive Lung Disease criteria) classifications were selected.

## EXCLUSION CRITERIA:

having unstable medical condition, acute bronchitis, pneumonia, an acute exacerbation of COPD, thoracic spinal scoliosis, substantial chest wall deformity, or acute rib or vertebral fracture. The subjects were excluded if they were unable to perform the pulmonary function test because of cognitive or physical impairments.

The lung function test was performed according to the American Thoracic Society guidelines.[7]

Dynamic volumes, including FEV1, FVC, PEFR and FEV1/FVC, were recorded before and after the mulligan therapy session.

## MULLIGAN THERAPY PROTOCOL

- The mulligan protocol session lasted ~30 minutes and consisted of the following mulligan techniques[8] :

**1.SUSTAINED NATURAL APOPHYSEAL GLIDES (SNAGS) :**

- PATIENTS POSITION: high sitting position on plinth.
- THERAPIST POSITION: standing postero-lateral to the patient.
- HAND PLACEMENT: patient crosses and rests his hands on the shoulders. Therapist grasps (hugs) the patient's torso (just above the level of mobilization) with one arm. Hypothenar eminence of the other hand of the therapist hooks the spinous process at the desired level.

- **MOBILIZATION :**
- To apply the glide, therapist pushes the desired spinous process towards the eyeball of the patient. Therapist applies force with the other hand also, grasping the patient as if he/she is trying to lift the

patient upwards. Patient performs the offending movement while the glide is maintained. Therapist should move his hands along with the movement in order to sustain the glide.

**2. MWMS FOR INTERCOSTAL SPACE:**

- PATIENTS POSITION: Sitting on a high plinth, patient's hands are placed behind his neck.
- THERAPIST POSITION: Standing behind the patient, very close to patient's body, therapist's knees are slightly flexed.
- HAND PLACEMENT: Therapist places ulnar aspect of both his hands in the intercostal area bilaterally. Hand should be placed obliquely along the intercostal space.
- MOBILIZATION: Therapist lifts the upper rib of the affected intercostal space of the patient using the ulnar border of his palm. Patient is instructed to take a deep breath while the therapist maintains the lift.

**3. MWMs FOR COSTOCHONDRAL/COSTOVERTEBRAL JOINTS**

- PATIENT POSITION: Sitting on a high plinth.
- THERAPIST POSITION: Therapist stand lateral to the affected side of the patient.
- HAND PLACEMENT:
- Heel of one hand (pisiform bone) is placed under the tubercle of the desired rib (lateral to transverse process) to be mobilized posteriorly.
- Pisiform of the other hand is placed under the costochondral joint anteriorly.
- Use piece of foam under the pisiform to avoid discomfort to patient.
- 
- **MOBILIZATION :**

Therapist performs the scooping movement with his hands to go deeper into soft tissues and mobilizes the desired costochondral and costovertebral joints by lifting the ribs. Patient is instructed to take a deep breath. Therapist moves his hand along with the patient's movement while maintaining the lift.

**RESULT**

Thirty subjects were enrolled in the study. Demographic characteristics are shown in Table 1. There was significant improvement in FEV1, FVC, FEV1/FVC and PEFR values (p=0.05) shown in table 2.

**TABLE -1 DEMOGRAPHIC DATA**

| CARECTERISTICS | MEAN±SD |
|---|---|
| AGE, YEAR | 52.8±6.8 |
| BODY MASS INDEX | 18.7±2.9 |

**TABLE -2 PULMONARY FUNCTIONS BEFORE AND AFTER MULLIGAN THERAPY.**

| OUTCOME MEASURE | PRE MULLIGAN | POST MULLIGAN | P VALUE |
|---|---|---|---|
| FEV1 | 53.25 | 75.03 | 0.00 |
| FVC | 62.45 | 79.74 | 0.00 |
| FEV1/FVC | 1.17 | 1.06 | 0.00 |
| PEFR | 43.51 | 57.74 | 0.00 |

Statistical analyses were performed using SPSS 20. The Wilcoxon test was used to analyse the data.

**DISCUSSION**

This study showed that a single mulligan therapy session immediately improves pulmonary function in patients with COPD. A previous study, investigating the short-term effect of Manual Therapy in patients with moderate COPD, administering a soft tissue-based form of Manual Therapy did not produce any short-term improvements in lung function, dyspnea levels, or exercise performance. Combining this with a joint-based form of Manual Therapy improved the dyspnea levels in the short term.[5]

According to the study results, a single Manual therapy session of soft tissue and joint mobilization immediately improved dyspnea. The authors previously reported that Manual Therapy increases respiratory muscle length and thoracic cage flexibility. These effects reduce the effort of breathing and development of dyspnea in COPD. [9]

Similarly, in our study, the difference between pulmonary function parameters and baseline to post treatment was found to be statistically significant. MT techniques might unlock the jammed facet, helps in stretching the structures on the convex side of the offending movement, and opens the intervertebral foramen. MT induced movement help to provide nutrition to the facet joints and disc. It might be correct the positional fault between affected facets, hence, correcting the biomechanics of the joints. It might release an entrapped meniscoid between facet joints. It might stimulate mechanoreceptors and proprioceptors in and around the joints, it helps to release muscle around the joints.[8]

**Limitation of the study**

Several limitations should be considered when interpreting the study results. Although the results were statistically significant when compared with the pre-treatment and posttreatment outcomes, the main limitations are the lack of the sham group and small sample size. Duration of the COPD patients was not known.

**Future study**

Future studies should focus on mild-to-moderate COPD patients, the effect of MT on different levels of COPD, and the long-term effect of MT.

**Clinical implication**

MT gives significant effect on respiratory functions so it may include in pulmonary rehab programme.

**CONCLUSION**

The nature of the conditions, symptoms, and functional limitations vary among patients; therefore, the management of COPD is complex. This is the first study to investigate the immediate effect of Mulligan Therapy on pulmonary functions in patients with COPD. MT gives significant effect on pulmonary functions. Mulligan Therapy should be integrated with pulmonary rehabilitation as a new alternative that produces fast results while motivating patients to continue treatment.

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