IMMIDIATE EFFECT OF STERNOCLEIDOMASTOID RELEASE ALONG WITH BREATHING EXERCISES ON DYSPNEA, PEFR AND FUNCTIONAL CAPACITY IN PATIENTS WITH COPD: A PRE AND POST EXPERIMENTAL STUDY.

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ABSTRACT:

Background: Chronic Obstructive Pulmonary Disease COPD is characterized by persistent airflow limitation, increased work of breathing, and overuse of accessory respiratory muscles such as the sternocleidomastoid SCM. This overactivity contributes to dyspnea, reduced peak expiratory flow rate (PEFR), and decreased functional capacity. Manual release of the SCM muscle combined with breathing exercises may provide immediate relief by improving respiratory mechanics.

Materials and Methods: An experimental study was conducted on 10 patients diagnosed with COPD, who were randomly divided into two groups: an experimental group n = 5 and a control group n = 5. Baseline assessment of dyspnea using the Modified Borg Scale, PEFR using a peak flow meter, and functional capacity using the 6-minute walk test 6MWT was performed for both groups. The experimental group received sternocleidomastoid SCM release along with breathing exercises diaphragmatic and pursed-lip breathing, while the control group received only breathing exercises. The intervention was administered in a single session. Outcome measures were reassessed immediately after the intervention. Data were analyzed using paired and unpaired t-tests, with the level of significance set at p less then 0.05.

Results: The experimental group showed a greater reduction in dyspnea and improvement in PEFR and 6MWT distance compared to the control group. The control group also demonstrated improvements, but the changes were less marked than those observed in the experimental group.

Conclusion: Sternocleidomastoid release combined with breathing exercises produces superior immediate improvements in dyspnea, PEFR, and functional capacity compared to breathing exercises alone in patients with COPD. This combined approach may be beneficial as an adjunct to pulmonary rehabilitation.

Keywords: COPD, sternocleidomastoid release, breathing exercises, dyspnea, PEFR, functional capacity.

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 extrapulmonary comorbidities that affect cardiovascular and musculoskeletal systems and can lead to malnutrition.

Dynamic lung hyperinflation is a key factor in pathophysiological pathways that leads to dyspnea and poor exercise tolerance in patients with COPD because it increases the ventilatory effort while reducing the ability of the inspiratory muscles to generate pressure. Previous studies have shown that hyperinflation increases the contribution of the ribcage and neck muscles and decreases the relative contribution of the diaphragm in patients with COPD. Accessory respiratory muscles include the sternocleidomastoid (SCM), scalene, trapezius, internal intercostal, and abdominal muscles.

Studies have demonstrated increased activation of SCM during breathing maneuvers and postural adaptations, indicating its significant role in compensatory breathing patterns .

However, prolonged overuse of accessory muscles may lead to muscle tightness, reduced chest wall mobility, and inefficient breathing patterns, further aggravating dyspnea.

In recent years, there has been growing interest in addressing musculoskeletal components of respiratory dysfunction in COPD. Interventions such as stretching and release of respiratory muscles have been found to improve chest expansion and functional capacity.

For instance, passive stretching of respiratory muscles has demonstrated improvements in chest wall mobility and exercise tolerance in COPD patients . Given the increased activity and tightness of accessory muscles like the SCM, targeted sternocleidomastoid release techniques may help reduce muscle overactivity, improve breathing mechanics, and decrease the work of breathing.

NEED FOR STUDY:

Dyspnea in COPD is not only due to airway obstruction but also results from altered respiratory mechanics and dysfunction of respiratory muscles. Due to lung hyperinflation, the diaphragm becomes less efficient, leading to increased reliance on accessory muscles such as the sternocleidomastoid (SCM). Chronic overuse of the SCM muscle may result in muscle tightness, fatigue, and inefficient breathing patterns, further worsening the sensation of breathlessness and reducing exercise tolerance.

Recent physiotherapy approaches emphasize the importance of combining respiratory techniques with manual therapy interventions. Sternocleidomastoid release techniques may help reduce muscle tightness, improve chest wall mobility, and promote more efficient breathing patterns. Despite this theoretical benefit, there is limited research investigating the **immediate effects** of SCM release, especially when combined with breathing exercises, on clinically relevant outcomes such as dyspnea, Peak Expiratory Flow Rate (PEFR), and functional capacity in COPD patients.

MATERIAL AND METHODOLOGY

- **Source of Data:** Pravara Rural Hospital, Loni
- **Study setting:** Dr. A.P.J Abdul Kalam college of physiotherapy, Loni.
- **Type of study:** Experimental study
- **Study Duration: 1 month**
- **Type of data:** Quantitative
- **Study Population:** Patient with COPD
- **Sample size: 10**(calculated using open EPI tool)

Inclusion criteria-

- Patients age from 40-70 years, diagnosed with COPD
- Both male and female
- Mild to moderate COPD (Gold criteria 1and 2)
- Clinically stable
- Patients with mild to moderate dyspnoea(MMRC<3)

Exclusion criteria-

- Gold criteria 3 and 4
- Patient with acute exacerbation of COPD
- Patients with any other condition than COPD that may cause dyspnoea
- Known case of cardiac disease

Outcome Measures:

- Dyspnoea
- PEFR
- Functional Capacity

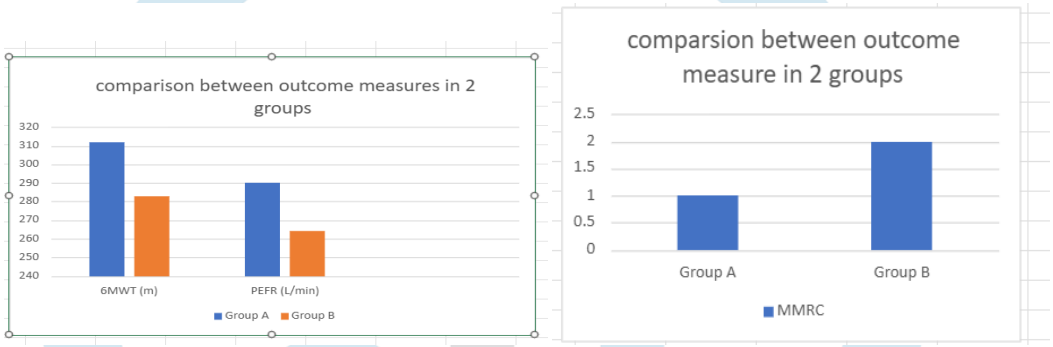
PROCEDURE

- The procedure was explained to all participants, and informed consent was obtained prior to data collection. Baseline (pre-test) measurements were recorded for dyspnea, Peak Expiratory Flow Rate (PEFR) using a peak flow meter, and functional capacity measure by 6 miute walk test.
- Following the baseline assessment, participants received a single-session intervention consisting of sternocleidomastoid (SCM) release and conventional physiotherapy.
- The SCM release was administered with the participant in a supine position, where the therapist applied a manual release technique along the length of the sternocleidomastoid muscle using gentle, sustained pressure.
- Immediately after the release technique, participants performed breathing exercises for a specified duration under supervision. After completion of the intervention, post-test measurements of dyspnea, PEFR, and functional capacity were recorded immediately using the same methods and instruments as in the pre-test.
- The immediate effect of the intervention was determined by comparing pre- and post-intervention values.

RESULTS

Within-group analysis using paired t-test showed a highly significant improvement ($p < 0.001$) in 6-minute walk test distance, MMRC dyspnoea score, and PEFR in Group A, whereas Group B showed only mild to moderate improvement.

Between-group comparison using unpaired t-test demonstrated that Group A showed significantly greater improvement compared to Group B in all outcome measures ($p < 0.01$).



DISCUSSION

The present study was conducted to find out the immediate effect of sternocleidomastoid (SCM) release along with breathing exercises on dyspnea, PEFR and functional capacity in patients with COPD. From the results, it was observed that the experimental group, which received SCM release with breathing exercises, showed better improvement compared to the control group which received only breathing exercises.

COPD is commonly associated with increased airway resistance, lung hyperinflation and altered breathing mechanics. Because of this, patients tend to use accessory muscles like SCM more during breathing. Continuous overuse of SCM can lead to tightness, decreased chest wall mobility and inefficient breathing pattern. So, releasing this muscle may help in reducing its overactivity and allow the diaphragm to function more effectively.

In this study, reduction in dyspnea was more in the experimental group. This could be because SCM release helps in relaxing the muscle and reducing the effort required for breathing. It may also improve coordination of respiratory muscles. When this is combined with diaphragmatic breathing and pursed-lip breathing, it further helps in improving ventilation and reducing air trapping. Similar findings have been reported in previous studies where manual therapy for respiratory muscles helped in reducing breathlessness.

There was also improvement seen in PEFR in the experimental group. This may be due to better chest expansion and improved recoil of the lungs after reducing muscle tightness. As a result, expiratory airflow improves. Pursed-lip breathing also plays a role by preventing airway collapse during expiration and helping in better airflow.

Functional capacity, measured by 6-minute walk test, also improved more in the experimental group. This may be because patients experienced less dyspnea and better breathing efficiency, which allowed them to perform activities with less fatigue. Even though the effect was immediate, it shows that SCM release can positively influence exercise tolerance by improving breathing mechanics.

The control group also showed improvement in all parameters. This is expected as breathing exercises are already known to be effective in COPD management. Diaphragmatic breathing reduces the use of accessory muscles and improves diaphragm function, while pursed-lip breathing helps in controlling expiration and reducing air trapping. However, the improvement was less compared to the experimental group, which suggests that adding SCM release gives additional benefit.

Overall, the findings suggest that combining manual therapy like SCM release with conventional breathing exercises may have better effects than breathing exercises alone. Similar studies using myofascial release and soft tissue techniques have also shown improvements in lung function, chest expansion and dyspnea.

However, this study has some limitations. The sample size was small, which may affect the generalization of the results. Only immediate effects were studied, so long-term benefits are not known. Also, there was no blinding and the duration of intervention was short, which may lead to some bias.

For future studies, larger sample size and long-term follow-up should be considered. It would also be useful to compare SCM release with other manual therapy techniques and to study the effect of multiple sessions. Including SCM release as a part of pulmonary rehabilitation program can be further explored to understand its clinical importance.

CONCLUSION

Sterno-cleidomastoid release combined with breathing exercises produces superior immediate improvements in dyspnea, PEFR, and functional capacity compared to breathing exercises alone in patients with COPD. This combined approach may be beneficial as an adjunct to pulmonary rehabilitation.

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