VOLUME - 12, ISSUE - 09, SEPTEMBER - 2023 • PRINT ISSN No. 2277 - 8160 • DOI : 10.36106/gjra

Original Research Paper

Cardiovascular

EFFECTIVENESS OF UNSUPPORTED UPPER EXTREMITY TRAINING AND SUPPORTED UPPER EXTREMITY TRAINING ON UPPER EXTREMITY ENDURANCE TEST AND CARDIOVASCULAR ENDURANCE IN GRADE II COPD PATIENTS: A COMPARATIVE STUDY

Shubham. M. Sangaonkar — Student, PES Modern College of Physiotherapy, Pune, Maharashtra, India

Dr. Gauri Afle — HOD, Cardiorespiratory Department, PES Modern College of Physiotherapy, Pune, India

ABSTRACT

Background Of the Study: COPD is the commonest pulmonary conditions and it is the major cause of morbidity and mortality [1] Upper extremities plays an important role in activities of daily living . [3] The upper extremity endurance training can increase the capacity to move light weights in COPD patients [1] **Objectives:** To study the effectiveness of supported and unsupported upper extremity training and compare the effectiveness in Grade II COPD patients on upper extremity endurance test (UULEX) and cardiovascular endurance by using 6 MWT over the period of 6 weeks. **Methodology:** 62 samples were collected including male and female based on inclusion and exclusion criteria in hospitals in and around Pune. Samples were assessed using Upper Extremity Endurance Test (UEET) and 6MWT **Result and conclusion :** The results showed and concluded that unsupported upper extremity training is more effective than supported upper extremity training in improving upper extremity endurance and cardiovascular endurance after six weeks of training in Grade II COPD patients.

KEYWORDS : Supported, Unsupported, Upper Extremity, Endurance, COPD

INTRODUCTION

COPD is the commonest pulmonary conditions and is a major cause of morbidity and mortality among pulmonary patients. [1] The 2021 theme for world COPD Day is "Healthy Lungs-Never more important. [2] It is recognized as a major public health problem, being a leading cause of morbidity and mortality that is projected to rank fifth in the burden of disease by the year 2020.[13] Upper extremities plays an important role in ADLs such as bathing , dressing , gardening ,carrying groceries[3]

There is a shift in respiratory load to the mechanically disadvantaged diaphragm, which results in thoracoabdominal dys-synchrony and dyspnoea.[11] Upper extremity muscle training increases inspiratory muscle strength as positively affects performance during ADLs in COPD patients.[9]

Pulmonary rehab has been recognized useful as it increases functional capacity, leads to improvement in dyspnoea and quality of life.[10] It is a comprehensive, multidisciplinary, multicomponent , patient-centered intervention, consisting of a prerehabilitation assessment program, muscle training, self-management education, occupational therapy, psychosocial support, and nutritional intervention.[10] Continuous and interval training , strength training are regarded as the major exercise components of Pulmonary rehab.[10]

OBJECTIVES

1. To study the effectiveness of unsupported upper extremity training in Grade II COPD patients on (UULEX) and cardiovascular endurance by using 6 MWT for 6 weeks.
2. To study the effectiveness of supported upper extremity training in Grade II COPD patients on UULEX and cardiovascular endurance by using 6 MWT for 6 weeks.
3. To compare the effectiveness of UUEET and SUEET in Grade II COPD patients on upper extremity endurance test (UEET) and cardiovascular endurance by using 6 MWT for 6 weeks.

Hypothesis

1. Null Hypothesis (H0) - There will be no significant difference in effect of UUEET and SUEET in patients with Grade II COPD with respect to UEET and 6 MWT over the period of 6 weeks.
2. Alternate Hypothesis (H1)- UUEET will be more effective than SUEET in patients with Grade II COPD with respect to UEET and 6 MWTover the period of 6 weeks.
3. Alternate Hypothesis (H2)- SUEET will be more effective than UUEET in patients with Grade II COPD with respect to UEET and 6 MWT over the period of 6 weeks.

MATERILAS AND METHODOLOGY

1. Study Design- comparative design.

2. Study Settings - purposive sampling in grade 2 COPD patients(moderate according to gold criteria) in hospitals in and around the Pune

3. Participants -62 participants(male and female)

4. Study Duration- 6 months

5. Intervention – 6 weeks(3 times a week)

6. Materials- Consent form, dumb-bells , Plastic bar(0.2kg), A0 –size chart marked with 8 different colors (84 cm × 120 cm), Stopwatch, Measuring tape , 30-metre stretch of unimpeded walkway, 2 cones, Pulse oximeter and SpO2, Sphygmomanometer

7. Inclusion Criteria

a. Diagnosed cases of COPD(Grade 2 according to GOLD classification)
b. Patients with FEV1,45%-50% of the predicted value, not involved in any exercise program for last 6 weeks.
c. Patients with endurance training(not include arm training)
d. Smoking history -5 or > 5 yrs.
e. Patients complaining of Chest tightness
f. Quantity of sputum > 2 tablespoons on sputum history

8. Exclusion Criteria

a. Patients with psychosocial disorder.
b. Known cases of other cardiovascular and respiratory illnesses with or without COPD.
c. History of recent fractures and soft tissue injuries related to upper limb, lower limbs and spine
d. Known case of disability and musculoskeletal deformities
e. Immunocompromised patients(HIV).
f. History of Cancer or malignant and non-malignant tumors.

g. Smoking history < 1 month
h. Patients who cannot walk.
i. Patients with lung surgery(lung reduction, lung transplant)

Outcome Measures

1. **Upper extremity endurance test -**
- Interpretations- Excellent- > 0.75
- Fair to good-0.40–0.75
- Poor-< 0.40

2. **6 MWT**-(ICC: .88 < R < .94)

Data Analysis And Procedure

Study included 62 participants(male and female) according to inclusion and exclusion criteria . The study began with a synopsis presentation in front of the ethical committee in PES Modern college of Physiotherapy. Ethical clearance was obtained. The patients were explained about the study and procedure. Consent form was taken. Patients were divided into two groups by simple sampling method.

Group A received SUEET and pulmonary Rehab and Group B received UUEET and pulmonary Rehab. Pre and post treatment measurements were taken by using outcome measures UEET and 6 MWT. Data was collected and analysis was done by using paired t test for within group and unpaired t test for in between two groups comparison.

PROTOCOL	
Group A	Group B
Pulmonary rehab Minimum 20 sessions 3 per week Exercises – warm up (5 min), (30min) Walking Purse lip Breathing Balance Exercises SUET -standing wall push ups Cool Down (5min)-stretching, shawasana	Pulmonary rehab Minimum 20 sessions 3 per week Exercises – warm up (5 min) (30min) Walking Purse lip Breathing Balance Exercises UUET -shoulder front raise, side raises(5-5times) Cool down (5 min)-stretching , shawasana

PR for unsupported UE Training


Fig 1.1 Fig 1.2


Fig 1.3 Fig 1.4

PR for Supported UE training

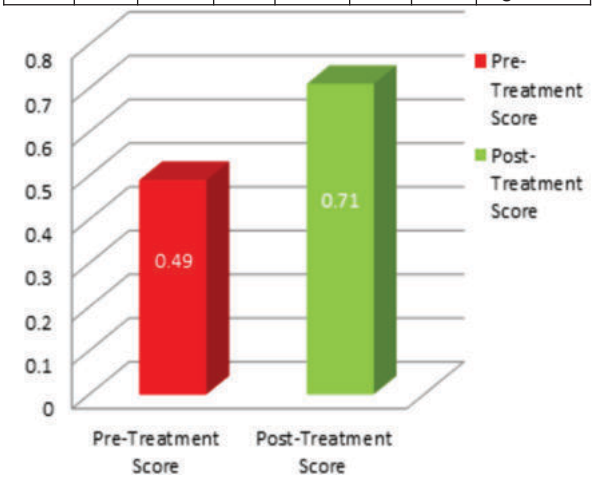

Fig 2.1 Fig 2.2


Fig2.2 Fig 2.4

RESULTS

Table no.1- Pre and Post Treatment Scores on UEET Group A

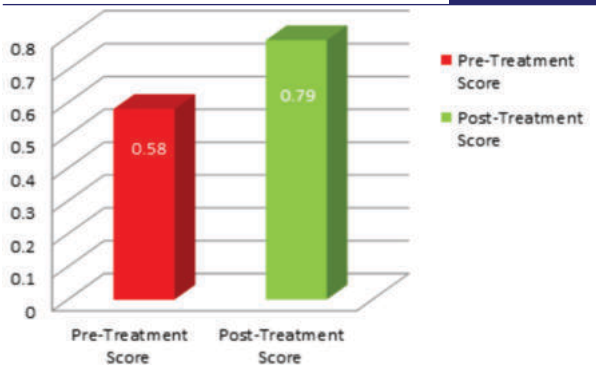
Parameters	Pre-Test		Post Test		T Value	P Value	Result
Ueet	Mean	SD	Mean	SD	20.435	<0.001	Extremely Significant
	0.49	±0.077	0.71	±0.058			



Graph no. 1-Pre and Post Treatment Scores on UEET Group A

Table no.2- Pre and Post Treatment Scores on UEET Group B

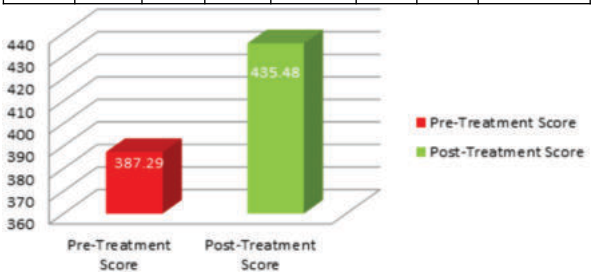
Parameters	Pre-Test		Post Test		T Value	P Value	Result
Ueet	Mean	SD	Mean	SD	18.709	<0.001	Extremely Significant
	0.58	±0.100	0.79	±0.063			



Graph no. 2-Pre and Post Treatment Scores on UEET Group B

Table no.3- Pre and Post Treatment Scores on 6MWT Group A

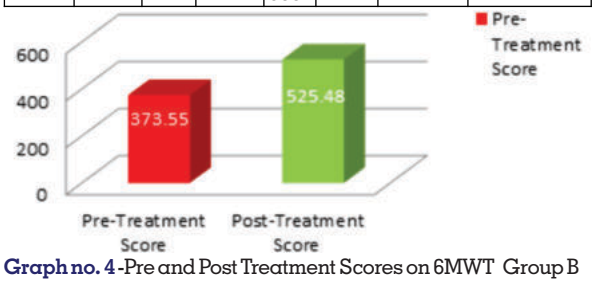
Parameters	Pre-Test		Post Test		T Value	P Value	Result
6mwt	Mean	SD	Mean	SD	11.169	<0.0001	Extremely Significant
	387.29	±56.348	435.48	±57.378			



Graph no. 3-Pre and Post Treatment Scores on 6MWT Group A

Table no.4- Pre and Post Treatment Scores on 6MWT Group B

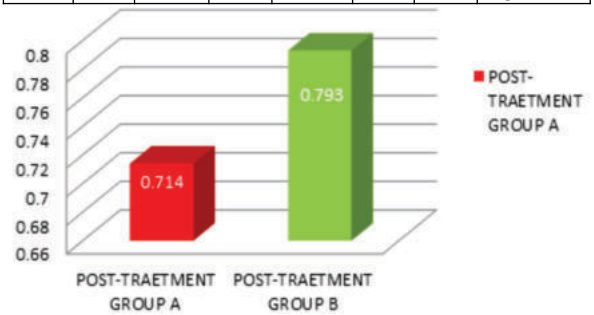
Parameters	Pre-Test		Post Test		T Value	P Value	Result
6mwt	Mean	SD	Mean	SD	19.03	<0.0001	Extremely Significant
	373.55	±59.417	525.48	±53.593			



Graph no. 4-Pre and Post Treatment Scores on 6MWT Group B

Table no.5- Comparison between group a and b post treatment on UEET

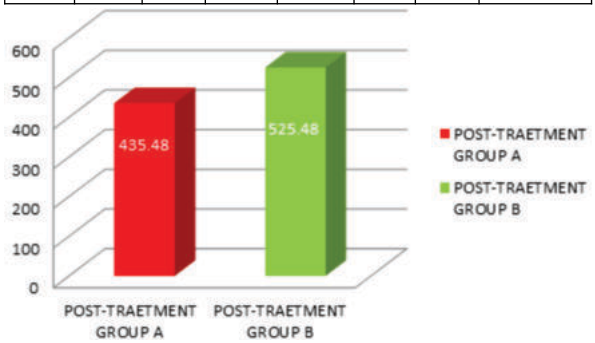
Parameters	Group A		Group B		T Value	P Value	Result
Ueet	Mean	SD	Mean	SD	4.876	<0.0001	Extremely Significant
	0.714	±0.057	0.793	±0.068			



Graph no.5- Comparison between group a and b on UEET

Table no.6- Comparison between group a and b post treatment on 6MWT

Parameters	Group A		Group B		T Value	P Value	Result
6mwt	Mean	SD	Mean	SD	6.382	<0.0001	Extremely Significant
	435.48	±57.378	525.48	±53.593			



Graph no.6- Comparison between group a and b on 6MWT

DISCUSSION

Aim of the study is to compare the effectiveness of UUEET and SUEET on UEET and cardiovascular endurance in Grade II COPD patients. Study included 62 samples. A number of studies have confirmed that people with COPD have reduced arm exercise capacity and experience marked dyspnoea and fatigue during the performance of arm tasks.[8] Airflow restriction and poor gas exchange may result from tissue damage and decreased (FEV1) .

Supported and unsupported upper extremity training improves the peripheral muscle strength of the limbs and it also decreases the fatigues level therefore dyspnoea is reduced.[13] It also influences peak arm exercise capacity, metabolic and ventilatory demands.[13] The muscles that moves the arms and stabilize the trunk are attached to the rib cage , this increases chest wall impedance , which reduces tidal volume during arm activities.[1]

6MWT improves in unsupported extremity training by improving the pulmonary function parameters, upper limb strength and the walking distance of the COPD patients.[14]

The results showed that UUEET is more effective than SUEET in improving upper extremity endurance and cardiovascular endurance. In the current study, better lung health and a decrease in hyperinflation , increased the ventilatory capacity during exercise, enabling more arm work.[16]

CONCLUSION

The study concluded that unsupported upper extremity training is more effective than the supported upper extremity training in grade II COPD patients. Hence we accepted Alternate Hypothesis (H1) .

Limitation

1. Small sample size.
2. Grade I,III, IV not included in the study.
3. Limited duration of intervention.
4. Lack of long-term follow-up.

Future Scope Of Study

1. Different population.
2. Larger sample size can be assessed.
3. Other age group can be considered.
4. Grade I, III, IV can be included in the study.
5. Long-term follow-up to assess the impact of interventions on UEET and cardiovascular endurance.
6. Comparison with other interventions(pulmonary rehabilitation or inspiratory muscle training)

7. Combination of interventions such as aerobic exercise or resistance training.

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