An Evidence-Based Study: Effect of Physiotherapy Treatment on Exercise Capacity in Patients with COPD

Perry Y. Patel¹, Dinesh Sorani²

¹First Year M.P.T. Student, Department of Physiotherapy, Government Physiotherapy College, Jamnagar, Gujarat, India
²I/C Principal, Department of Physiotherapy, Government Physiotherapy College, Jamnagar, Gujarat, India

Corresponding Author: Perry Y. Patel

ABSTRACT

Background: Chronic obstructive pulmonary disease (COPD) is a respiratory disorder, associated with an ongoing limitation of airflow. COPD negatively having effects on patients’ functional capacity. 

Introduction: COPD having negative effects on patients’ physical, occupational, and social functioning due to limited functional capacity and experience of frequent dyspnoea and fatigue during activities. To determine effective physiotherapy treatment on exercise capacity (6-MWT) in patients with COPD.

Design: The articles were searched in Google scholar, PubMed, Elsevier, Cochrane library by using keywords Chronic obstructive pulmonary disease (COPD), 6-Minute Walk Test(6-MWT). Articles which were done during the year 2012 - 2019 were only selected. Articles were selected only if they were Systematic review and meta-analysis, randomized controlled trial(RCT), includes subject with COPD, Exercise capacity (6-Minute Walk Test) were used as one of the outcome measure and physiotherapy intervention was given as a treatment.

Results: 80 to 85 articles were searched from different database out of them 10 articles were selected for the study, 5 systematic review and 5 RCTs. Data were extracted by one reviewer that includes the intervention description, inclusion/exclusion criteria, baseline data, values for all outcomes at baseline, post-intervention and follow-up.

Conclusion: Findings indicate that physiotherapy treatment, Inspiratory Muscle Techniques (IMT), Cycle Ergometer Training, Resistance Training, Manual Diaphragmatic Release Technique, Muscle Energy Techniques (MET), Yoga with Breathing Control, Diaphragmatic Breathing Training, Aerobic Exercise, Upper Limb Resistance Exercise and Breathing Exercises are effective to improve exercise capacity (6-MWT). Resistance Training, Muscle Energy Techniques, Aerobic Exercise, Yoga with Breathing Control- these are the techniques which having 1A level of evidence. So, these are highly recommended to improve exercise capacity in patient with COPD.

Keywords- COPD, 6-Minute Walk Test (6-MWT), Physiotherapy treatment, Inspiratory Muscle Training (IMT), Diaphragmatic Breathing Training

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a respiratory disorder, associated with an ongoing limitation of airflow, mainly to the expiratory airflow.¹² The cause of COPD is a chronic...
inflammation in the lung and airways in response to poisonous particles and gases. During physical activity, COPD-associated limitation in the airflow is exacerbated and so dyspnoea prevents patients from continuing physical activity. [3] COPD having negative effects on patients’ physical, occupational, and social functioning due to limited functional capacity and experience dyspnea and fatigue during daily activities. [4,5]

Physiotherapy has been used for reduced exercise capacity. Inspiratory Muscle Training (IMT), Cycle Ergometer Training (CET), pulmonary rehabilitation (PR), resistance training, manual diaphragmatic release technique, muscle energy technique (MET), Yoga, Aerobic Exercise, Diaphragmatic Breathing Technique, upper limb and breathing exercises- All are used for exercise capacity. Treatment Outcome are measured by 6-Minute Walk Test (6-MWT) at baseline and at end of the treatment phase and in some study, it measures at some specific interval. Evidence based research is needed to determine effective therapeutic techniques to improve exercise capacity (6-MWT).

METHODOLOGY
Search strategy and study selection:

RESULTS

The articles were searched in Google scholar, PubMed, Elsevier, Cochrane library by using keywords Chronic obstructive pulmonary disease (COPD), 6-Minute Walk Test. Articles which were done during the year 2012 - 2019 were only selected.

Inclusion criteria for articles are:
- Systematic review and meta-analysis Or Randomized Control Trials (RCT).
- The articles that includes subjects with COPD.
- Use of physiotherapy intervention for treatment of reduced exercise capacity.
- 6- MWT as one of the outcome measures.

Articles were excluded if they were Cor-relational study or Case study, other than physiotherapy treatment as an intervention and reduced physical exercise due to COPD only.

Study Selection: 80 to 85 articles were searched from different database out of them 10 articles were selected for the study.

Quality measurement:
Data were extracted by one reviewer that includes the intervention description, inclusion/exclusion criteria, baseline data, values for all outcomes at baseline, post-intervention and follow-up.
**Perry Y. Patel et al. An evidence-based study: effect of physiotherapy treatment on exercise capacity in patients with COPD**

<table>
<thead>
<tr>
<th>Author</th>
<th>Study Design</th>
<th>No. Of Subjects</th>
<th>Treatment</th>
<th>Intervention</th>
<th>Outcome measures</th>
<th>Results</th>
<th>Level of evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rugbyerg M Et Al., (2015)</td>
<td>A Systematic Review with Meta-Analysis</td>
<td>4 RCTs (489 Participants)</td>
<td>Pulmonary Rehabilitation</td>
<td>Aerobic exercise, Pursed lip breathing, other breathing exercises, cycling, walking session duration=30 to 90 minutes, frequency= twice/ thrice a week for 4 to 6 months.</td>
<td>Outcomes are Health-Related Quality of Life (HRQOL), maximal exercise capacity (6-MWT), muscle strength.</td>
<td>Significant improvement in 6-MWT but <strong>clinically nonsignificant</strong> improvement in 6-MWT,</td>
<td>IA</td>
</tr>
<tr>
<td>Ning Li Et Al., (2019)</td>
<td>A Systematic Review</td>
<td>11 RCTs (405 Participants)</td>
<td>Resistance Training</td>
<td>Leg press, knee extension, knee flexion, chest press, seated row, and shoulder press, lop abduction in standing, seated row, lunges etc. with different-different duration, repetition and frequency</td>
<td>Outcome measures are <strong>6MWT</strong>, CWRET (constant work rate endurance test), 6PBRT(6-min pegboard and ring test) UULEX (unsupported upper limb exercise test), and CPET (cardiopulmonary exercise test)</td>
<td>Resistance training significantly improved 6-min walking distance <strong>6MWT</strong></td>
<td>IA</td>
</tr>
<tr>
<td>Paneroni M Et Al., (2017)</td>
<td>A Systematic Review and Meta-Analysis</td>
<td>10 RCT (n=458)</td>
<td>Aerobic Exercise Training</td>
<td>Aerobic Exercise Training (Leg exercises, cycling, free walking, treadmill walking included) duration from 4 to 52 weeks with 1 to 5 sessions per week lasting 15 to 40 minutes each.</td>
<td>Outcome measures are 6-minute walking test(6-MWT) and/or health-related quality of life assessed by the St. George's Respiratory Questionnaire (SGRQ).</td>
<td>Statistically significant improvement in 6-MWT</td>
<td>IA</td>
</tr>
<tr>
<td>Baxter Da Et Al., (2019)</td>
<td>A Systematic Review</td>
<td>3 RCTs (90 Participants)</td>
<td>Muscle Energy Technique (MET)</td>
<td>1st RCT subjects receive MET + CPT (conventional chest physiotherapy) 2nd RCT subjects receive MET 3rd RCT subjects receive MET + exercise</td>
<td>Outcomes are Inspiratory Capacity, Forced Expiratory Volume in One Second (FEV1), And Forced Vital Capacity (FVC). Exercise Capacity Measured by Six-Minute Walk Test (6MWT), Quality of Life or Health Status.</td>
<td>2 studies assessed exercise capacity using the 6MWT individual study results showed that MET+CPT was superior to CPT alone. In the other study, MET + exercise therapy improved walking distance compared to sham-MET + exercise therapy</td>
<td>IA</td>
</tr>
<tr>
<td>Holger Cramer Et Al., (2019)</td>
<td>A Systematic Review and Meta-Analysis</td>
<td>11 RCTs (586 Participants)</td>
<td>Yoga</td>
<td>Hatha yoga, Pranayama, laughter yoga, Kripalu yoga, Iyengar yoga etc. with conventional drug or physiotherapy as co-intervention Duration 2 weeks to 9 months, Frequency= once/ twice daily or twice weekly, Session duration= 10-90 Minute</td>
<td>quality of life, dyspnea, exercise capacity(6-MWT), and pulmonary function (FEV1),</td>
<td>Effects of yoga with breathing on exercise capacity (6-MWT), but yoga posture was not significantly affecting the 6-MWT</td>
<td>IA</td>
</tr>
<tr>
<td>Wellington P. Yamaguti et al., (2012)</td>
<td>RCT</td>
<td>Total = 30 Treatment group= (n=15) Control group= (n=15)</td>
<td>Diaphragmatic breathing training program</td>
<td>Training group completed a 4-week supervised DBTP (3 individualized weekly sessions), while control group (CG) received their usual care.</td>
<td>Outcome assessed by amplitude of the rib cage to abdominal motion ratio (RC/ABD ratio) and diaphragmatic mobility, 6-minute walk test (6-MWT)and health related quality of life</td>
<td>6-MWT distance improved in treatment group.</td>
<td>IB</td>
</tr>
<tr>
<td>Rocha T Et Al., (2015)</td>
<td>RCT</td>
<td>Total= 20 Manual Diaphragmatic</td>
<td>The experimental group received six treatments with the manual diaphragm</td>
<td>The experimental group received six treatments with the manual diaphragm</td>
<td>Outcome are diaphragmatic mobility, the 6-minute walk test(6-MWT) significantly improved the 6-minute walk</td>
<td>Manual Diaphragmatic Release Technique</td>
<td>IB</td>
</tr>
<tr>
<td>Reference</td>
<td>Study Design</td>
<td>Total</td>
<td>Group 1</td>
<td>Group 2</td>
<td>Group 3</td>
<td>Treatment</td>
<td>Control</td>
</tr>
<tr>
<td>-----------</td>
<td>--------------</td>
<td>-------</td>
<td>---------</td>
<td>---------</td>
<td>---------</td>
<td>-----------</td>
<td>---------</td>
</tr>
<tr>
<td>Wang K et al. (2017)</td>
<td>RCT</td>
<td>81</td>
<td>CET+IMT</td>
<td>CET</td>
<td>Free Walking</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yekefallah L et al. (2019)</td>
<td>RCT</td>
<td>75</td>
<td>Group 1</td>
<td>Group 2</td>
<td>Group 3</td>
<td>Upper Limb Exercise (Strengthening Exercises) And Breathing Exercises (Pursed-Lip and Diaphragmatic Breathing).</td>
<td></td>
</tr>
<tr>
<td>Bavarsad Mb et al. (2015)</td>
<td>RCT (Single-Blind)</td>
<td>40</td>
<td>Treatment</td>
<td>Control</td>
<td></td>
<td>Inspiratory Muscle Training (IMT)</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** 6MWT = 6-minute walk test; CET = Cycle Ergometer training; IMT = Inspiratory Muscle Training.
CONCLUSION

According to these articles Inspiratory Muscle Techniques (IMT), Cycle Ergometer Training, Resistance Training, Manual Diaphragmatic Release Technique, Muscle Energy Techniques, Yoga with Breathing Control, Diaphragmatic Breathing Training, Aerobic Exercise, Upper Limb Resistance Exercise and Breathing Exercise – These physiotherapy treatments are effective to improve exercise capacity. (6-MWT)

Resistance Training, Muscle Energy Techniques, Aerobic Exercise, Yoga with Breathing Control- these are the techniques which having 1A level of evidence. So, highly recommended to improve exercise capacity in patient with COPD.

Pulmonary rehabilitation (Aerobic exercise, Pursed lip breathing, other breathing exercises, cycling, walking) clinically not shows any significant difference and only Yoga posture was not improving 6-MWT.

ACKNOWLEDGEMENT
I would like to thank my parents, guide and senior for their support and guidance.

REFERENCES
2. Ellen Hillegass (Essential of Cardio-pulmonary physical therapy (4th edition)
13. Wang K, Zeng GQ et al., Cycle ergometer and inspiratory muscle training offer modest benefit compared with cycle ergometer alone: a comprehensive assessment in stable
Perry Y. Patel et al. An evidence-based study: effect of physiotherapy treatment on exercise capacity in patients with COPD


How to cite this article: Patel PY, Sorani D. An evidence-based study: Effect of physiotherapy treatment on exercise capacity in patients with COPD. Int J Health Sci Res. 2020; 10(3):103-108.

*****