Galore International Journal of Health Sciences and Research
[Indexed, Peer-Reviewed Journal]
Vol. 11; Issue: 3; July-Sept. 2026
Website: www.gijhsr.com
Case Series *P-ISSN: 2456-9321*

Impact of Physiotherapy on Functional Outcomes in Patients with Chronic Obstructive Pulmonary Disease (COPD): A Case Series

Buba Ahmad Imam Musa[1], Prashna Napit[1], Shivpriya Sharma[2]

[1]BPT, Department of Physiotherapy, Sharda School of Allied Health Sciences, Sharda University, Greater Noida
[2]Assistant Professor, Department of Physiotherapy, Sharda School of Allied Health Sciences, Sharda University, Greater Noida

Corresponding Author: Shivpriya Sharma

DOI: https://doi.org/10.52403/gijhsr.20260309

ABSTRACT

Background: One of the main causes of death in the world today is chronic obstructive pulmonary disease (COPD). Patients with COPD benefit greatly from the respiratory care and rehabilitation provided by physiotherapists.
Case presentation: Six male patients with clinically diagnosed COPD, ages 50 to 72, participated in a case series. A two-week physiotherapy treatment that included breathing exercises: deep breathing, pursed-lip breathing, thoracic expansion exercises and airway clearance techniques: mechanical vibration was provided to the participants. The COPD Assessment Test (CAT) and the Modified Medical Research Council (mMRC) Dyspnea Scale along with symptoms and vitals were used as outcome measures before and after the intervention.
Results: Each case showed continuous improvement after the intervention. Each patient's mMRC grades improved by one level, and their CAT scores considerably dropped, moving from "very high" or "high" impact to "medium" impact categories.
Conclusion: Structured Physiotherapy protocol significantly improves functional capacity, reduces dyspnea, and enhances the quality of life in patients with COPD. These findings support the inclusion of physiotherapy as an essential component of comprehensive COPD management.

Keywords: COPD, physical therapy, physiotherapy rehabilitation, breathing exercises.

INTRODUCTION

One of the main causes of death in the world today is chronic obstructive pulmonary disease (COPD), and its prevalence is predicted to increase over the next several years. Airflow restriction and ongoing respiratory symptoms are hallmarks of chronic obstructive pulmonary disease (COPD), a disease that can be prevented and treated.[1] It is a third leading cause of death globally.[2] The prevalence of COPD among the Indian population was 7.4%, according to the study conducted by Roy Daniel and others in 2021.[3] In COPD, chronic inflammation causes long-term lung damage. Lung recoil is weakened by elastin degradation, which narrows and traps airways, reducing airflow. Higher resistance and permanently constricted airways are the results of structural alterations like fibrosis. By damaging alveolar walls, reducing the surface area available for gas exchange, and upsetting the ventilation-perfusion balance, emphysema exacerbates the illness. When exhaling, these combined effects slow down

and decrease airflow. The degree of tissue remodeling, inflammation, and mucus buildup in the small airways is indicated by the degree of airway obstruction.[4]

COPD leads to a range of symptoms, including shortness of breath, coughing, sputum production, wheezing, and chest tightness of varying intensity. For many individuals, these symptoms create a persistent and significant challenge in performing everyday activities.[5,6] formerly believed to be caused on by tobacco usage, new researches suggests that fifty percent of the COPD cases globally are caused because of non-tobacco related risk factors. These include air pollution, occupational hazards, poorly controlled asthma, exposure to smoke and infections, and low socioeconomic status. Childhood lung growth impairment brought on by a variety of early-life exposures is linked to a higher chance of developing COPD.[7] Airway inflammation, mucus hyper-secretion, and gas trapping are some of the characteristics linked to COPD episodes. Iinflammatory reactions are typically brought on by infection. The most common cause is respiratory virus infections, but environmental factors and bacterial infections may play a role. These incidents are caused by or made worse by variables like ambient temperature and air pollution.[8]

Based purely on spirometry (post-bronchodilator $FEV_1/FVC < 0.70$ + FEV_1% predicted, COPD is divided into following GOLD stages:GOLD 1 (Mild): $FEV_1 \geq 80$ % predicted, GOLD 2 (Moderate): 50 % $\leq FEV_1 < 80$ % predicted, GOLD 3 (Severe): 30 % $\leq FEV_1 < 50$ % predicted, GOLD 4 (Very Severe): $FEV_1 < 30$ % predicted (or $FEV_1 < 50$ % with chronic respiratory failure in some definitions).[9]

According to the GOLD 2025 report, COPD should be diagnosed in individuals with persistent respiratory symptoms or relevant risk factors using post-bronchodilator (BD) spirometry, where an FEV1/FVC ratio below 0.7 confirms airflow limitation. Pre-BD spirometry may help exclude COPD, but confirmation requires post-BD testing. This approach also helps detect volume responds and minimizes the risk of over-diagnosis.[10]

Patients with COPD benefit greatly from the respiratory care and rehabilitation provided by physiotherapists. In critically ill patients, especially those with diseases involving hyper-secretion, physiotherapy is frequently used to prevent and/or correct mucus retention along with pulmonary function deterioration. Chest physiotherapy is thought to be a viable method to improve mucus clearance in individuals who have mucus retention.[11] So, in this case series, we discussed about different physiotherapy interventions provided to different patients with COPD.

CASE PRESENTATION

CASE-1

A 50-year-old male painter, presented with shortness of breath for 5 days and a productive cough for 1 week. He is a known case of COPD with a past history of stroke causing left-sided hemiplegia. He was on NIV support at arrival, with an RR of 27 breaths per minute and SPO_2 of 88%. Grade 2 soreness over the trachea and upper to mid-thorax was revealed by cardio-respiratory results. Auscultation revealed bilateral coarse crepitation with rhonchi and normal heart sounds. There was clubbing and a Kussmaul-type breathing pattern, which suggests respiratory distress. An ABG showed elevated CO_2 levels, and a chest X-ray showed hyper-inflated lungs with a flattened diaphragm. The mMRC grade was 4. Overall, the results point to a Type II respiratory failure associated with an acute flare-up of COPD. The goals of physiotherapy are to increase airway clearance, promote ventilation and restore functioning.

CASE-2

A 53-year-old male driver, presented with sudden shortness of breath, talking and walking. After examination and investigations, he was diagnosed with meningoencephalitis with COPD and

pneumonia. On arrival, he had RR of 18 breaths per minute and SpO2 of 94%. Auscultation revealed bilateral decrease in air entry with occasional crepitation and normal heart sounds. A chest X-ray showed infiltrates in right lung. The mMRC grade was 3. The goals of physiotherapy are to increase airway clearance and increase ventilation.

CASE-3

A 71-year-old male farmer and chronic smoker for 40 years, presented with complaints of dyspnea, cough, and expectoration. On examination, his vital signs were stable with HR 87 bpm, RR 17 bpm, BP 130/60 mmHg, and SpO_2 85% on room air. Auscultation revealed bilateral crackles and rhonchi, indicating diffuse airway obstruction and secretions. Chest X-ray showed hyperinflated lung fields with bilateral infiltrates suggestive of COPD changes with possible infection or inflammation. Grade 3 mMRC was present. He was diagnosed with COPD with pulmonary TB. The goals of physiotherapy are to clear lung secretions and improve lung potency.

CASE-4

A 72-year-old male farmer, presented with shortness of breath and fever for 1 day. On examination, his vital signs were stable with HR 92 bpm, RR 12 bpm, BP 129/73 mmHg, and SPO_2 94% on room air. Auscultation revealed bilateral basal crepitus and rhonchi. Chest X-ray showed hyperinflated left lung with bilateral infiltrates suggestive of COPD changes with possible infection or inflammation. Grade 3 mMRC was present. He was diagnosed with COPD with dengue fever. The overall goal is to improve airway and enhance lung function.

CASE-5

A 61-year-old male, presented with shortness of breath, cough with expectoration along with palpitation. On examination, her vital signs were stable with HR 94 bpm, RR 20 bpm, BP 118/82 mmHg, and SPO_2 93% on room air. Auscultation revealed bilateral wheeze and decreased A/E on left side. Chest X-ray showed bilateral infiltrates suggestive of COPD changes with possible infection. mMRC grade 3. Patient was diagnosed with COPD with LRTI. The goals of physiotherapy are to clear lung secretions and improve lung potency.

CASE-6

A 71 years old Male patient arrived on 21st of January 2026 to Hospital with a complaint of shortness of breaths and chest pain for 5 year which became unbearable 1 month back which was associated with exertion, aggravated on lying position, relieved on sitting, associated with cough, expectoration for 2 months back, episodic fever and generalized weakness. On examination his vitals were above normal; BP: 162/102 mmHg, RR: 26 breaths per minute, Pulse: 141 beats per min, SPO_2 on RA: 77%, Temperature: 98.6F. Auscultations results in bilateral HVBS with Diffuse Rhonchi normal S1S2. Chest Xray revealed hyper-inflated lungs, flattened diaphragm and secretions in the lower lobes suggestive of COPD. MMRC grading scale grades 3. The patient was diagnosed with COPD associated with Type 2 respiratory failure and CAP. The Main physiotherapy goal was to improve Lung potency, mobilization and Functional dependency. And related goals were to prevent contracture, maintain ROM and return to ADLs.

Table 1: Case Presentation

Parameters	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Age/Gender	50/M	53/M	71/M	72/M	61/M	71/M
Occupation	Painter	Driver	Farmer	Farmer	Sweeper	Farmer
History of smoking	Chronic smoker for 32 years	Tobacco (inconsistent for years)	Chronic smoker 40years	Tobacco (inconsistent for years)	Tobacco (inconsistent for years)	45 years smoker (stopped 4 years)
Symptoms	Dyspnea, clubbing, cough	Difficulty in breathing	Dyspnea, expectoration, cough	Shortness of breath	Shortness of breath, cough with expectoration, palpitation	Shortness of breaths, Cough, Chest pain, fever and Weakness
Vitals	HR: 82bpm RR: 27bpm BP:140/60 mmHg SPO_2: 88%	HR: 107bpm RR: 16bpm BP:117/98 mmHg SPO_2: 95%	HR: 87bpm RR: 17bpm BP:130/60 mmHg SPO_2: 85%	HR: 92bpm RR: 12bpm BP:129/73 mmHg SPO_2: 94%	HR: 94bpm RR: 20bpm BP:118/82mmHg SPO_2: 93%	HR: 141 bpm RR: 26 bpm BP: 162/101 mmHg SPO_2: on RA: 77% on O2: 98%
Lung sounds	B/L coarse crepitation with rhonchi present	occasional crepitation B/L	B/L crackles with rhonchi present	B/L basal crackles with rhonchi present	B/L wheezes, decreased A/E on left side	B/L diffuse Rhonchi
X-ray	Hyper-inflated lungs and flattened diaphragm	Infiltrates on right lung	Hyper-inflated with b/l infiltrates	Left lung hyper-inflated with b/l infiltrates	bilateral infiltrates	Hyper-inflated Lungs with flattened diaphragm
mMRC (pre-physiotherapy)	Grade 4	Grade 3	Grade 3	Grade 3	Grade 3	Grade 3
CAT (pre physiotherapy)	31 (very high)	22 (high)	28 (high)	22 (high)	26 (high)	22 (High)

TREATMENT

Table 2: Physiotherapy treatment protocol

EXERCISES	FREQUENCY	INTENSITY	TIME	TYPE
Diaphragmatic breathing	5 days/week TD	Low to moderate (10 reps of 3 sets)	5-15mins	Therapeutic breathing exercise for respiratory control
Pursed lip breathing	5 days/week TD	Low to moderate (10 reps of 3 sets)	10-15min	Therapeutic breathing exercise
Thoracic expansion exercise with limb movements	5 days/week TD	Low to moderate (10 reps of 3 sets)	10-20min	Chest and lung mobility exercise
Mechanical vibrator	5 days/week TD	Moderateb(10 reps of 3 sets)	3-5min	PT technique for Airway clearance

Figure 1: Diaphragmatic breathing

Figure 2: Thoracic expansion exercise

Figure 3: pursed lip breathing

OUTCOME MEASURES

The outcome measures used in this research is COPD assessment Test (CAT) which is widely used to measure health status and impact of COPD on daily life and mMRC dyspnea scale which is used to assess severity of breathlessness. In this study both was used pre and post interventions to check the efficacy of the interventions.

RESULTS

After 2 weeks of physiotherapy interventions in all Six patients, mMRC dyspnea scale and COPD assessment Test (CAT) were used again to determine the outcome of the interventions.

Table 3: Comparison of parameters pre and post physiotherapy protocol

Parameters	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6
Age/Gender	50/M	53/M	71/M	72/M	61/M	71/M
mMRC (pre-physiotherapy)	Grade 4	Grade 3	Grade 3	Grade 3	Grade 3	Grade 3
mMRC (post-physiotherapy)	Grade 3	Grade 2	Grade 2	Grade 2	Grade 2	Grade 2
CAT score (pre-physiotherapy)	31 (very high)	22 (high)	28 (high)	22 (high)	26 (high)	22 (high)
CAT score (post-physiotherapy)	24 (high)	16 (medium)	20 (medium)	15 (medium)	19 (medium)	15 (Medium)

DISCUSSION

The present case series evaluated the effects of a structured physiotherapy program on patients diagnosed with Chronic Obstructive Pulmonary Disease (COPD). The intervention protocol included pursed-lip breathing, diaphragmatic breathing, thoracic expansion exercises, and airway clearance techniques. Following the intervention, all patients demonstrated improvements in respiratory parameters, including reduced respiratory rate, increased oxygen saturation (SpO_2), lower Modified Medical Research Council (mMRC) dyspnea grades, and decreased COPD Assessment Test (CAT) scores. These findings indicate an overall improvement in respiratory efficiency, symptom control, and health-related quality of life.

The reduction in dyspnea observed in the present study is consistent with the recommendations of the Global Initiative for Chronic Obstructive Lung Disease (GOLD), which emphasizes symptom reduction and improvement in quality of life as primary goals of COPD management.[1] Breathing retraining techniques such as pursed-lip breathing and diaphragmatic breathing are known to improve breathing patterns, decrease dynamic hyperinflation, and reduce the sensation of breathlessness. Rodriguez et al. reported that breathing exercises enhance ventilatory efficiency and decrease respiratory muscle workload, thereby improving respiratory performance in individuals with COPD.[1] Similar outcomes were observed in the current study, where improvements in mMRC grades reflected a reduction in perceived breathlessness.

Thoracic expansion exercises incorporated in the intervention protocol may have contributed to improved chest wall mobility and enhanced lung expansion. Previous studies have demonstrated that chest mobility exercises positively influence pulmonary function by improving thoracic compliance and facilitating deeper inspiration.[12] The observed increase in oxygen saturation and improvement in respiratory parameters among the participants may be attributed to these physiological benefits. Furthermore, airway clearance techniques and mechanical chest physiotherapy are recognized for their role in facilitating mucus clearance and maintaining airway patency. Effective removal of retained secretions can reduce airway obstruction, improve gas exchange, and decrease the risk of respiratory complications. Womboh et al. reported that chest physiotherapy interventions contribute to improved functional outcomes and respiratory status in patients with chronic respiratory diseases.[8] The findings of the present case series support these observations, as participants demonstrated improved respiratory function and symptom control following the intervention. Exercise-based physiotherapy and pulmonary rehabilitation have also been widely recommended for individuals with COPD.

Engel et al. highlighted the long-term benefits of physiotherapy interventions in improving exercise tolerance, reducing symptom burden, and enhancing overall quality of life in patients with chronic respiratory disorders.[12] The reduction in CAT scores observed in this study further supports the effectiveness of physiotherapy in improving patients' perception of health status and daily functioning.

Overall, the findings of this case series reinforce the growing body of evidence supporting physiotherapy as an essential component of multidisciplinary COPD management. The combination of breathing exercises, thoracic expansion techniques, and airway clearance strategies produced clinically meaningful improvements in respiratory function, symptom severity, and quality of life. Early initiation of physiotherapy and consistent patient adherence may play a crucial role in optimizing clinical outcomes and reducing the long-term burden of COPD.

CONCLUSION

This case series demonstrated that structured physiotherapy interventions, including breathing exercises and airway clearance techniques, resulted in significant improvements in respiratory function, reduction in dyspnea, and enhancement of quality of life in patients with COPD. Improvements in mMRC dyspnea grades and CAT scores further support the effectiveness of physiotherapy in reducing symptom burden and improving functional capacity. These findings highlight the importance of incorporating physiotherapy into the comprehensive management of COPD, with early intervention and regular adherence contributing to better clinical outcomes and overall patient well-being.

Informed Consent

Written informed consent was obtained from the patient's guardians for publication of this case report.

Declaration by Authors

Acknowledgement: None

Source of Funding: No funding was received for this study.

Conflict of Interest: The authors declare that they have no conflicts of interest regarding the publication of this case report.

REFERENCES

1. Vogelmeier, C. F., Román-Rodríguez, M., Singh, D., Han, M. K., Rodríguez-Roisin, R., & Ferguson, G. T. (2020). Goals of COPD treatment: Focus on symptoms and exacerbations. *Respiratory medicine*, *166*, 105938. https://doi.org/10.1016/j.rmed.2020.105938
2. Kahnert, K., Jörres, R. A., Behr, J., & Welte, T. (2023). The Diagnosis and Treatment of COPD and Its Comorbidities. *Deutsches Arzteblatt international*, *120*(25), 434–444. https://doi.org/10.3238/arztebl.m2023.027
3. Daniel, R. A., Aggarwal, P., Kalaivani, M., & Gupta, S. K. (2021). Prevalence of chronic obstructive pulmonary disease in India: A systematic review and meta-analysis. *Lung India : official organ of Indian Chest Society*, *38*(6), 506–513. https://doi.org/10.4103/lungindia.lungindia_159_21
4. Brashier, B. B., & Kodgule, R. (2012). Risk factors and pathophysiology of chronic obstructive pulmonary disease (COPD). *The Journal of the Association of Physicians of India*, *60 Suppl*, 17–21.
5. Miravitlles M, Ribera A. Understanding the impact of symptoms on the burden of COPD. Respir Res. 2017 Apr 21;18(1):67. doi: 10.1186/s12931-017-0548-3.
6. Yang, I. A., Jenkins, C. R., & Salvi, S. S. (2022). Chronic obstructive pulmonary disease in never-smokers: risk factors, pathogenesis, and implications for prevention and treatment. *The Lancet. Respiratory medicine*, *10*(5), 497–511. https://doi.org/10.1016/S2213-2600(21)00506-3
7. Ritchie, A. I., & Wedzicha, J. A. (2020). Definition, Causes, Pathogenesis, and Consequences of Chronic Obstructive Pulmonary Disease Exacerbations. *Clinics in chest medicine*, *41*(3), 421–438. https://doi.org/10.1016/j.ccm.2020.06.007
8. Ceyhan, Y., & Tekinsoy Kartin, P. (2022). The effects of breathing exercises and

inhaler training in patients with COPD on the severity of dyspnea and life quality: a randomized controlled trial. *Trials*, *23*(1), 707. https://doi.org/10.1186/s13063-022-06603-3

9. Singh, D., Stockley, R., Anzueto, A., Agusti, A., Bourbeau, J., Celli, B. R., Criner, G. J., Han, M. K., Martinez, F. J., Montes de Oca, M., Ozoh, O. B., Papi, A., Pavord, I., Roche, N., Salvi, S., Sin, D. D., Troosters, T., Wedzicha, J., Zheng, J., Volgelmeier, C., … Halpin, D. (2025). GOLD Science Committee recommendations for the use of pre- and post-bronchodilator spirometry for the diagnosis of COPD. *The European respiratory journal*, *65*(2), 2401603. https://doi.org/10.1183/13993003.01603-2024
10. Martí, J. D., McWilliams, D., & Gimeno-Santos, E. (2020). Physical Therapy and Rehabilitation in Chronic Obstructive Pulmonary Disease Patients Admitted to the Intensive Care Unit. *Seminars in respiratory and critical care medicine*, *41*(6), 886–898. https://doi.org/10.1055/s-0040-1709139
11. Zakaria, I., Serry, Z. M. H., Soliman, Y. M. A., Aziz, M. M., Mohamed, M. I., & Guirguis, S. A. (2025). Chest mobility exercises versus proprioceptive neuromuscular facilitation in patients with chronic obstructive pulmonary disease: A randomized trial. *Journal of bodywork and movement therapies*, *44*, 400–408. https://doi.org/10.1016/j.jbmt.2025.05.057
12. Engel, R. M., Gonski, P., Vemulpad, S., & Graham, P. L. (2024). The Long-Term Benefit of Exercise With and Without Manual Therapy for Mild Chronic Obstructive Pulmonary Disease: A Randomized Controlled Trial. *Journal of cardiopulmonary rehabilitation and prevention*, *44*(4), 257–265. https://doi.org/10.1097/HCR.0000000000000871

How to cite this article: Buba Ahmad Imam Musa1, Prashna Napit, Shivpriya Sharma. Impact of physiotherapy on functional outcomes in patients with chronic obstructive pulmonary disease (COPD): a case series. *Gal Int J Health Sci Res*. 2026; 11(3): 72-79. *DOI: https://doi.org/10.52403/gijhsr.20260309*

******