

# Short Review on Effectiveness of Upper Limb Exercises and Breathing Exercises in COPD Stable Patients During COVID-19 Pandemic Era

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## ABSTRACT

One of the most common problems found in Chronic Pulmonary Obstructive Disease (COPD) patients is decreased tolerance to physical exercises, which increases the mortality rate and the frequency of hospitalization due to the weakening of respiratory function. This condition also leads to weak periphery and respiratory muscles. Pulmonary rehabilitation is the foundational treatment for COPD patients that can improve their training capacity, health-related quality of life and reduce the use of health-care facilities. In compliance with Global Initiative for Chronic Obstructive Lung Disease (GOLD) 2022 nonpharmacological initiative for COPD, patients are recommended to do physical activities within their capabilities, while observing physical distancing as a protective measure during the Coronavirus Disease 2019 (Covid-19) pandemic. Pulmonary telerehabilitation presents a feasible solution to overcome the obstacles faced by the healthcare industry to provide in-house rehabilitation programme at hospitals or other health centres. Therefore, it is our objective to study and evaluate the benefits and effectiveness of home-based pulmonary rehabilitation (HBPR).

**Keywords:** COPD, home-based pulmonary rehabilitation, breathing exercise, upper limb exercise

## BACKGROUND

COPD is a slow and progressive respiratory disease marked by persistent obstructed air flow and respiratory symptoms. It is caused by tobacco smoking, exposure to biomass fuel, pesticide, air pollution, and abnormal lung development [1,2]. COPD patients may deal with thinning muscle mass due to breakdown of proteins in the muscles which lead to skeletal muscle atrophy. The effects will be in the form of lower respiratory functions, decreased tolerance to physical activities, lower quality of life, and death [3].

Pulmonary rehabilitation is a form of intervention beneficial for COPD patients in which it can reduce breathing difficulty, anxiety, depression, hospital admission, increase health status as well as exercise tolerance [2,5]. In

this current pandemic, it is not feasible for COPD patients to routinely visit health-care institutions to get medical rehabilitation. It is said that the risk of COPD patients infected with coronavirus pneumonia shows significant difference in terms of ICU observation, use of intubation and mortality, compared to non-COPD patients; although, the rate of COPD patients developing coronavirus pneumonia is not as high as previously thought [6]. Therefore, we offer an alternative to COPD patients to do a home-based pulmonary rehabilitation that is effective, safe and clinically improving their conditions. The telerehabilitation program will be monitored using the current communication technology to support the rehabilitation process which involves evaluation, monitoring, prevention, intervention, supervision, education, consultation and counselling [8].

## METHOD

- This research is a quasi-experimental study involving 10 respondents with stable COPD
- Respondents were taught the procedures of the breathing techniques at one meeting at the hospital. Furthermore, the patient did the exercises at home independently which would then be monitored via videos sent by the research respondents to the researchers.
- Respondents will undergo with a frequency of 2 times a week for 1 month. Before and after undergoing exercise, the respondent underwent examination lung functional capacity was measured by 6MWD ( 6 minutes walking Distance), Perceived exertion scale by mMRC (modified medical research council) and Borg, The severity of symptoms by CAT (COPD assessment test), The quality of life by SGRQ (St. George's respiratory questionnaire) and changes muscle mass.
- There are several procedures of the breathing techniques performed by the participants: Pre-exercise participants inhaled fast-acting bronchodilators such as 2.5 mg Salbutamol and did light warm-up and stretching to prevent muscle strains for 5-10 minutes. Then, the participants performed breathing exercise which are consists of Breathing exercise, The Bird move, The No-Way move, The Whatever Move, The Fan, The Clucking Chicken, The Vampire move, The Beckoning, The Butterfly, The cool-down exercise [9].
- Participants had to perform each move/exercise in 10 repetitions with the intensity of 13-minute duration. This upper-extremity exercise was based on the video previously shown by the researchers.
- The training session would be temporarily stopped if subjects reported muscle pain, breathing difficulty or headache. It would be resumed when the symptoms receded. After the training session was over, subjects did the cool-down exercise for 5-10 minutes.
- Statistical analysis was performed with Wilcoxon and Paired T-test.

## RESULTS

On the whole, the characteristics of the respondents in our study were male with the most age group was 60-69 years, Height < 160 cm, Smoker with cigarette consumption > 30 cigarettes/day and the degree of Brinkman index was severe. Prior to the intervention, an assessment was performed on

the most exertion scale with an mMRC  $\geq 2$  and Borg with moderate dyspnea. The highest CAT was  $\geq 10$  and there are significant results on the muscle mass and the results of the SGRQ questionnaire interview before and after the intervention.

A lung tele-rehabilitation intervention in the form of home-based breathing and upper-body exercises was implemented on 10 study samples of COPD stable patients. After 4 weeks of home training with twice-a-week frequency, the results showed significant improvement, with p-value < 0.05, in the increased 6MWD value ( $16.4 \pm 4.45$  to  $19.8 \pm 3.64$ ), mMRC ( $1.90 \pm 1.10$  to  $0.90 \pm 0.87$ ), Borg ( $3.05 \pm 1.53$  to  $1.40 \pm 1.42$ ), CAT ( $15.7 \pm 6.63$  to  $11.8 \pm 5.24$ ), muscle mass ( $28.36 \pm 2.89$  to  $31.86 \pm 3.97$ ) and SGRQ Symptoms questionnaire (60.87 to 45.47), Activity questionnaire (60.87 to 45.47), Impact questionnaire (33.85 to 24.19).

## DISCUSSION

In this study, we did an observation based on several previous studies conducted on several parameters of COPD patients namely:

Croitoru et al. performed 6MWD, mMRC, and SGRQ intervention tests on COPD patients by doing a 7-week, 3 times-a-week lung rehabilitation which yielded positive final results [10]. Another intervention also showed increased 6MWD in COPD or Interstitial Lung Disease (ILD) patients who undertook pulmonary rehabilitation for 22 weeks [11].

Wuytack et al. did a comparative study in which no significant difference was found between in-house/hospital and home-based lung rehabilitation or physical exercise [12]. Similarly, our research also showed a significant improvement in the quality of life of COPD patients.

Vasilopoulou et al. studied on the effectivity of home-based telerehabilitation as opposed to rehabilitation at hospitals. There was a decrease of acute exacerbation risk as well as that of CAT scores of COPD patients after 14 months of rehabilitation [13].

Jipa Duna et al, conducted a research on 10 patients undertaking a rehabilitation program (5 COPD, 2 Bronchiectasis, 1 Cystic Fibrosis, 1 Lung Cancer and 1 Idiopathic Pulmonary Fibrosis patients). At the end of the training program there was an increase in muscle mass [14].

Based on the results of the aforementioned researches, it can be concluded that pulmonary rehabilitation is greatly advantageous, be it conducted at home or in health centres. Lung rehabilitation can also improve functional capacity, scale of breathlessness, quality of life, degree of severity and muscle

mass. In addition, particularly during the pandemic, home-based rehabilitation can reduce the number of hospital/health centre visitations and lower the risk of exposure/infection while being in the health-care institutions.

This research also reveal the effectiveness of upper limb exercises and breathing exercises in COPD stable patients. Although this study has limitation such as researcher cannot directly evaluate participants when doing exercises, only videos sent by participants and cannot confirm whether the participant underwent a rehabilitation program with excessive or less frequency while doing the recommended exercise. Unexpectedly, the results of this research offered satisfactory results in stable COPD patients who undergo home-based pulmonary rehabilitation obediently and as recommended.

### LIST OF ABBREVIATIONS

COPD : Chronic Obstructive Pulmonary Disease  
 GOLD : Global Initiative for Chronic Obstructive Lung Disease  
 COVID-19: Coronavirus Disease 2019  
 HBPR : Home-Based Pulmonary Rehabilitation  
 6MWD : 6 minutes walking Distance  
 mMRC : Modified Medical Research Council  
 CAT : COPD assessment test  
 SGRQ : St. George's respiratory questionnaire  
 ILD : Interstitial Lung Disease

### ETHICS APPROVAL

Ethics Committee approval for the study was obtained from the Local Ethics Committee of Universitas Sumatera Utara (No.255/TGL/KEPK FK USU-RSUP HAM/2020).

### CONFLICT OF INTEREST

There is no conflict of interest.

### AUTHORS CONTRIBUTIONS

APT & AHT conceived and designed the study, conducted research, provided research materials, and collected and organized data. APT, PP, AHT and PCE analysed and interpreted data. APT and AHT wrote initial and final draft of article and provided logistic support. All authors have critically reviewed and approved the final draft and are responsible for the content and similarity index of the manuscript.

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Not Applicable

### REFERENCES

1. Daga S, Khadke V, Phalgune D, Chopadawala A. Evaluation of severity of chronic obstructive pulmonary disease using bronchial obstruction, dyspnea, exercise index and global initiative for chronic obstructive lung disease classification and it's correlation with physical quality of life measured by St. George's respiratory disease questionnaire score. *Int J Adv Med.* 2020; 7: 608-15, <http://dx.doi.org/10.18203/2349-3933.ijam20201109>
2. Global Initiative for Chronic Obstructive Lung Disease. *GOLD Report 2022. Global Initiative for Chronic Obstructive Lung Disease.* 2022.
3. Çilekar S, Tülek B, Kanat F, Süerdem M, et al. Effect of low-intensity pulmonary rehabilitation program on quality of life and pulmonary functions in patients with stable chronic obstructive pulmonary disease. *Eurasian J Pulmonol.* 2019; 21:14-20, doi: 10.4103/ejop.ejop\_16\_19
4. Benzo, Roberto P, Kevin M. Kramer, Johanna P. Hoult, et al. "Development and feasibility of a home pulmonary rehabilitation program with health coaching." *Respiratory care*63, no. 2. 2018; 131-140, doi: 10.4187/respcare.05690
5. Beykümü A, Gülbas G. COVID-19 and pulmonary rehabilitation. *Eurasian J Pulmonol.* 2020; 22:S101-4, doi: 10.4103/ejop.ejop\_56\_20
6. Turan O, Mirici A. Chronic obstructive pulmonary disease and COVID-19. *Eurasian J Pulmonol.* 2020; 22:S56-60, doi: 10.4103/ejop.ejop\_36\_20
7. Holland AE, Mahal A, Hill CJ, et al. Home-based rehabilitation for COPD using minimal resources: a randomised, controlled equivalence trial. *Thorax.* 2017; 72(1): 57–65, doi: 10.1136/thoraxjnl-2016-208514
8. Salawu A, Green A, Crooks M.G, Brixey N, et al. A proposal for multidisciplinary tele-rehabilitation in the assessment and rehabilitation of COVID-19 survivors. *International journal of environmental research and public health.* 2020; 17(13), p.4890, doi:10.3390/ijerph17134890
9. Tarigan AP, Ananda FR, Pandia P, Sinaga BYM, Maryaningsih M, Anggriani A. The Impact of Upper Limb Training with Breathing Maneuver in Lung Function, Functional Capacity, Dyspnea Scale, and Quality of Life in Patient with Stable Chronic Obstructive of Lung Disease. *Open Access Maced J Med Sci.* 2019 Feb 28; 7(4):567- 572, <https://doi.org/10.3889/oamjms.2019.113>
10. Croitoru A, Ioniță D, Stroescu C, et al. Benefits of a 7-week outpatient pulmonary rehabilitation program in COPD patients. *Pneumologia.* 2013; 62(2): 94–8, 101
11. Lalwani L, Mishra G. Effect of Pulmonary Rehabilitation on Six-Minute Walk Distance in Patients with Chronic Obstructive Pulmonary Disease or Interstitial Lung Disease. *Indian Journal of Basic and Applied Medical Research.* 2019; 8(2): 405–409.

12. Wuytack F, Devane D, Stovold E, et al. Comparison of outpatient and home-based exercise training programmes for COPD: A systematic review and meta-analysis. *Respirology*. 2018; 23(3): 272–283, doi: 10.1111/resp.13224
13. Vasilopoulou M, Papaioannou AI, Kaltsakas G, et al. Home-based maintenance tele-rehabilitation reduces the risk for acute exacerbations of COPD, hospitalisations and emergency department visits. *Eur Respir J*. 2017; 49(5), doi: 10.1183/13993003.02129-2016,
14. Jipa-Dună D, Croitoru A, Bezdedeanu A, et al. The effects of a respiratory rehabilitation programme on body composition. *Pneumologia*. 2020; 69(1): 29–36, doi: 10.2478/pneum-2020-0008.