

Chest Physical Exercise in COVID-19 Patients: A Review Article

Pradivo Luigi Akbar, Edrik Sinawang

Faculty of Medicine, Universitas Brawijaya

¹Corresponding Author Email: [pradivolugi.dr\[at\]gmail.com](mailto:pradivolugi.dr[at]gmail.com)

Abstract: *The current global pandemic of COVID-19 has brought the entire world to a standstill, causing illness, death and changing individual roles. The most common causes of morbidity and mortality in these patients include pneumonia and respiratory failure, requiring the patient to undergo artificial ventilation and other techniques that can improve respiratory function. One such technique is thoracic physiotherapy, and has been shown to improve gas exchange, reverse disease progression, and reduce or avoid the need for artificial ventilation when very well provided. early in other respiratory conditions. For patients with COVID-19, there is little evidence of its effects, especially in the acute phase and in patients on mechanical ventilation. In contrast, in post-hospital discharge patients, thoracic physiotherapy in the form of respiratory muscle training, cough exercises, diaphragmatic exercises, stretching exercises, and home exercises improved FEV1, FVC, FEV1/FVC%, pulmonary diffusivity for carbon monoxide (DLCO), endurance and quality of life, as well as reduction in symptoms of anxiety and depression. However, there is still controversy about the ability of thoracic physiotherapy to disperse aerosols and accelerate the spread of infection, especially since COVID19 is highly contagious.*

Keywords: COVID-19, pulmonary rehabilitation, chest exercise

1. Introduction

The World Health Organization defines a severe coronavirus 2 (SARS-CoV-2) infection as a pandemic infection. This infection can cause a potentially very severe respiratory illness, now called coronavirus disease 2019 (COVID-19), having airborne transmission through droplets. The rate of transmission is quite high, higher than ordinary influenza.^{1,2}

In a strategy to restore health, physical exercise (PE) is a non-drug and/or prophylactic treatment for various conditions such as depression, cardiovascular disease, respiratory disease, weakness/sarcoma, and chronic fatigue syndrome. It stands out as a treatment. In addition to the quality of life of those who are particularly ill or recovering from illness, physical fitness and the ability to perform activities of daily living are also actively associated with PE. Although the positive health effects of PE are widely recognized, little is known about recommendations for people recovering or recovering from COVID 19.^{3,4}

Many reviews and studies have attempted to address questions about PE prescribing in COVID 19 recovery, but biosecurity protocols, exercise monitoring, assessments, and other aspects that should be part of the PE program, a population of problems. Few studies have made recommendations for systematic summarization. A COVID 19 recovery program that takes these factors into account is to reduce immobility-related complications, prevent medium-to long-term readings, and improve the health and perceived quality of life of people affected by the disease. It is an important treatment tool. Taken together, these benefits can reduce public health costs and reduce hospitalizations and mortality directly or indirectly related to COVID 19.^{5,6} This literature review will discuss about PE prescription in COVID-19 infection.

Physical Exercise Protocols

The use of PE for rehabilitation after COVID 19 is a consensus between the studies involved. Safety and Effectiveness of PE as a Rehabilitation Strategy for Respiratory Disorders Chronic Obstructive Pulmonary Disease is described in detail in the scientific literature. However, the conclusions of the current review are primarily based on story reviews, opinion pieces, and research, but not on the original research using robust methods.⁷

Considering all studies, aerobic and muscular exercise are best suited for people recovering from COVID 19, regardless of combination. The combination of strength training (ST) and aerobic training (AT) was used in two studies and was performed over 5-7 weeks. According to reviews and opinion studies and studies, aerobic exercises such as walking and cycling should be done 3-5 times a week for about 30 minutes per session, preferably in combination with strength exercises. Medical and rehabilitation specialists from various centers in Europe and North America also recommend combining strength and aerobic training. In any case, intensity and quantity should be gradual throughout the training program, over 2-4 weeks, or based on the patient's tolerance and / or correct exercise performance.^{8,9}

Each session should consider individual physical condition, with the protocol adapted to disease severity. The program can also include treatment counseling, COVID-19 management and signs via educational sessions; a multiprofessional team composed of physical education professionals, doctors, nurses, physiotherapists, occupational therapists, psychologists, speech therapists, nutritionists, social workers and others.^{10,11}

Clinical Evidence

In severe COVID-19 cases, pulmonary function becomes significantly compromised. Among the patients who are hospitalized, an estimated 15% requires ICU support. Currently there is no definite cure for COVID-19; however,

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empirical use of antiviral, antibacterial, and disease-modifying anti-inflammatory agents appear to be effective in selective cases. Therefore, the preventive recommendations and guidelines remain crucial, particularly social distancing, staying home strategy, hand hygiene and cough etiquette to prevent transmission of COVID-19.^{1,2}

Alongside medicinal interventions, PE should be started at the start of inpatient-stay, throughout the entire stay, and continued at outpatient service and in the community. An important step of PR includes the cleaning of airways at regular intervals, otherwise, bronchial secretions may lead to blocked airways resulting in difficulty breathing. Although the cough is usually nonproductive in COVID-19, productive coughing up phlegm can occur at a later stage.^{1,3} According to a retrospective study, severe COPD patients participated in a three-week in-house PE program that included airway drainage, initiation of long-term oxygen therapy, endurance and strength training, high-intensity inspiratory muscle training, and respiratory physiotherapy for breathlessness. This resulted in a significant improvement ($p < 0.001$) of 6MWT, modified Medical Research Council Dyspnea (mMRC) Score, and FEV₁ scores.^{1,4} Supervised early PR in COPD also reduced the mortality risk, hospital readmission, hospital stay, and improved HRQoL, and walking distance. Increased aerobic capacity can improve immune and respiratory function.^{1,5} However, outcomes of these interventions in COVID-19 cases are still to be determined and an algorithm of PE for chronic respiratory conditions could be an acceptable alternative, and technology will be used increasingly to mitigate increased patients' demands.^{1,6}

If the patient remains intubated, even small changes in position can adversely affect the ventilation / perfusion ratio and leave the alveolar gas exchange uncoordinated. However, in patient's withdrawal from the ICU, postural changes and recumbent position may improve alveolar gas exchange and clearance of lung secretions, reducing the incidence of lung infections. In addition, spontaneous deep breathing and early mobilization maximize respiratory and diaphragmatic strength and facilitate recovery of respiratory function. Importantly, the timing of respiratory movements in patients discharged from the ICU has not yet been determined and will vary from patient to patient.^{1,7} With respect to these aspects, the physiotherapist examines the patient who needs physiotherapy, decides on the appropriate treatment program, decides how much the patient should take, and how to tell the physiotherapist.^{1,8} The role of the rehabilitation physician is to treat the patient's medical problems while participating in the rehabilitation process. The physiatrist evaluates the patient and ensures that the patient is medically stable to participate in the treatment. Despite these differences, both therapists and physiotherapists work together to ensure that patients receive appropriate treatment in the current COVID 19 pandemic. There needs to be preparation of an interdisciplinary rehabilitation team to implement long-term functioning and the most effective practices for quality of life.^{1,9}

Preparation of Pulmonary Rehabilitation in COVID-19

During PE, respiratory muscle performance is rarely considered. Although reliability and validity with COVID 19 have not yet been tested, testing of incremental respiratory endurance and maximal inspiratory and expiratory devices seems to help measure respiratory muscle performance. Under adverse conditions such as aging, obesity, inactivity, smoking, and viral infections, respiratory muscle strength is further reduced, and breathing is due to the associated high airway resistance and increased oxygen demand and consumption due to changes in chest wall dynamics. It supplements your ability to generate muscle strength. Breathing is an important part of physical education. However, successful exercise requires diaphragm strength, limb posture and balance, joint freedom of movement, diet, and proper fluid intake adjustments. Therefore, these factors should be considered during the initial PE. Rehabilitation of early inpatients includes mechanical ventilation, bed mobilization, bed-to-chair movement, sitting-standing exercise, assisted gait, and neuromuscular electrical stimulation of the limb muscles, respiratory function, Measured by quadriceps function and gait. Bartel dyspnea score. Index, quadriceps size, EuroQoL questionnaire. In addition, a dynamic patient-guided robot suspension system assists in the development of gait, ADL performance, 6MWT, and gait test speeds of 10 meters. At COVID19, an 8-segment PR exercise program in Traditional Chinese is considered promising, especially when prescribing traditional breathing methods and proprioceptive neuromuscular promotion. Existing spa rehabilitation facilities can be used for COVID 19PE rehabilitation.^{20, 21}

Isolated psychological or psychological problems within the framework of PICS. Post-traumatic stress disorders, anxiety, depression have been recorded with COVID19 infections. RCT recovered from COVID19, FEV₁/FVC, 6MWT, SAS, QoL, and 72 Chinese patients compared to controls who showed positive results ($p < 0.05$) for FIM scores, but a short-term study.^{2,2} In, PE interventions did not appear to be effective in improving depression levels, so long-term research is needed. In addition to improving quality, it suggests that the PE program may also help improve anxiety and depression. In a letter to the editors, Zhu et al.^{2,3} Furthermore, we have shown that PR, which combines psychological intervention and sleep promotion, can reduce anxiety and depression in patients with COVID19. PE continues to improve ADL and global functional capacity, regardless of patient age. Isolated COVID 19 patients can benefit from PE through instructional videos, instruction manuals, or telemedicine. After completing the hospitalization program, you can continue to provide self-management and sports counseling through telemedicine technology. However, telemedicine cannot evaluate 6MWT, manual muscle tests, grip strength, and gait. Instead, implement a 1-minute Sit-to-Stand test (1STS) to assess athletic performance and cardiovascular response, and a 5-fold STS test to assess and monitor muscle strength, oxygen saturation, and exercise prescribed to the patient. Telemedicine is cheap, does not require patients or doctors to travel, and may seem unrealistic in developing countries, but it can serve everyone regardless of geographic location. Personal interviews are considered appropriate for patients

who are unable to participate in a remote rehabilitation program due to balance disorders and require input.²⁴

2. Conclusion

Chest physiotherapy can improve respiratory function and quality of life, especially in patients with COVID 19 after discharge. Except for some expert recommendations based on anecdotal evidence, evidence of their benefits in the acute phase is still lacking. However, keep in mind that chest physiotherapy regarding PE is a personalized treatment based on the patient's specific symptoms. Therefore, if the patient presents with symptoms that may benefit from thoracic physiotherapy, the patient can be administered with careful monitoring of adverse events.

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