

# COVID-19 pandemic: regular physical activity and respiratory exercises at home as prevention and treatment

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## Abstract

The main question in the field of exercise and rehabilitation medicine is whether physical activity and therapeutic exercise are suitable activities for COVID-19 patients who are recovering at home. There have been few public health guidelines provided about what people can do in relationship with exercise and respiratory care. For this reason, it is necessary that physical therapists give some recommendations concerning safe respiratory and physical exercises that could be executed by people with confirmed, suspected, or probable COVID-19 who stay at home.

**Key words:** physical activity, COVID-19, respiratory exercise

On December 31, 2019, the World Health Organization (WHO) was notified about a cluster of cases of unknown-cause pneumonia in Wuhan city, China; then, the causative pathogen was identified as a new type of coronavirus, and the disease was named COVID-19 [1]. On January 30, 2020, WHO declared a public health emergency state of international concern caused by the outbreak of the novel coronavirus [2]. At the time of writing of this paper (November 17, 2020), there had been 54,771,888 confirmed cases in more than 200 countries worldwide, with America (23,371,968) and Europe (15,475,400) being the continents with the highest number of confirmed cases [3].

The most common clinical manifestations in COVID-19 patients include fever, fatigue, dry cough, loss of taste, myalgia, and dyspnoea [4]. However, the spectrum of the disease severity ranges from asymptomatic infection, through mild upper respiratory tract illness, to severe viral pneumonia with respiratory failure. Around 80% of people suffering from COVID-19 present mild or moderate symptoms of the disease and do not require specialized medical attention [1]. To avoid a health system overburden, patients with mild symptoms and without other risk factors are sent to recovery at home; they are advised to follow the recommendations about hands and respiratory hygiene, environmental cleaning, and preventive measures of physical activities [5].

Isolation has been shown to be an effective means to cut off the transmission path of the disease and WHO recommended it for individuals classified as a suspect case, probable case, or confirmed case. This situation restricts people's participation in outdoor activities, including physical activity. Prolonged home stay can make people dedicate longer periods to sedentary behaviours, decreasing their physical activity levels [6]. These behaviours might have a negative impact on health, mainly in the elderly and patients with comorbidities, who are groups with a higher probability for developing complications due to COVID-19.

At present, studies are being developed for testing the efficacy of Veklury (remdesivir) for the treatment of hospitalized patients with COVID-19. Recently, the Food and Drug Administration approved Veklury (remdesivir) to treat COVID-19 in adults and paediatric patients (aged from 12 years to older people and weighing at least 40 kg) requiring hospitalization. While vaccines and specific medications for COVID-19 are not yet available, other public health and individual measures could play an essential role in reducing the severity of symptoms and accelerating recovery. Physical therapists must take preventive actions and disseminate health-promoting behaviours to maintain the fitness and endurance of people of all ages [7, 8]. Therefore, it is necessary for physical therapists to give some recommendations about safe respiratory and physical exercises that could be executed by people with confirmed, suspected, or probable COVID-19 who stay at home.

The main question in the field of exercise and rehabilitation medicine is whether physical activity and therapeutic exercise are suitable activities for COVID-19 patients who are recovering at home during this pandemic. Nevertheless, there have been few public health guidelines provided about what people can do in relationship with exercise and respiratory care.

In healthy people, WHO recommends a weekly practice of 150 minutes of moderate or 75 minutes of vigorous physical activity or an equivalent combination of them; however, Jiménez-Pavón et al. [9] suggest to increase this time to 200 minutes per week, with the aim of compensate for the decrease in the normal daily physical activity levels. According to the current evidence, the effect of exercise on immune function remains hotly disputed. Previous studies have shown that physical activity can diminish the risk of several communicable diseases, as well as improve immune health via an increase in immune cells [10–12]. Some results have established that a single session of high-intensity physical activity

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of long duration weakens the immune system for several hours following the exercise, increasing the risk of inspiratory tract infection in this period [13]. In contrast, there is evidence that regular practice of moderate-intensity physical activity strengthens the immune system and decreases the possibility to experience respiratory tract viral infections; moreover, these investigations were developed in healthy people, not in patients with COVID-19 [14, 15]. Edwards et al. [16] demonstrated that anxiety and perceived psychological stress levels before exercise played an important role in determining the immune response after exercise. For this reason, it is crucial to take into account other factors before the execution of a single bout of exercise when examining the immune response.

Considering the current outbreak of COVID-19, which is an infectious disease that leads to progressive acute lung injury or acute respiratory distress syndrome in many patients, it is conceivable that regular exercise promotes the extracellular superoxide dismutase (EcSOD) gene/protein expression and might mitigate oxidative stress in the lung tissue [17]. However, owing to the possible negative influence of COVID-19 on the immune system, it seems to be more cautious regarding continuous exercise in symptomatic patients [18]. In the subset of patients in whom the disease has progressed to pneumonia but who are recovering at home, the return to physical activity is much slower and should be gradual, comprising 4 weeks or even more. Nevertheless, this does not imply that the individuals should stay totally at rest at home; conversely, they should perform therapeutic respiratory exercise to improve the ventilatory mechanics, as well as reduce respiratory symptoms and complications.

During recovery, most patients have significantly increased sitting and lying-down time; people with symptoms like fever, cough, and difficulty breathing are advised not to do physical exercise. These patients should be encouraged to undertake respiratory exercises to maintain good cardiorespiratory health. There is no evidence that respiratory rehabilitation improves the main symptoms generated by COVID-19; however, exercises to re-establish the ventilatory pattern and pulmonary volumes, permeabilize the airway, and eliminate bronchial secretions can be recommended to avoid the impact on lung damage [19].

As a conclusion, low- to moderate-intensity exercise may be helpful for asymptomatic patients or individuals with symptoms limited to the area over the neck (e.g. sneezing and sore throat) and may involve aerobic, strengthening, balance, and stretching exercises in private environments owing to the high rate of spread [20]. Examples of home exercises include skipping in place, walking in the house, biceps curl and triceps overhead with elastic band, wall push-ups, sit-to-stand movement, split squat, and bridge. Regarding the respiratory exercise program, patients will be able to perform pursed lip breathing, abdominal or diaphragmatic breathing, costal breathing combined with arms movement [19], breathing exercises with a volumetric type incentive spirometer [21], active cycle breathing techniques, and airway permeabilization exercises, such as slow breathing exercises with the mouth open (like in the huffing manoeuvre) or expiration exercises with the help of domestic positive expiratory pressure (PEP; 'bottle PEP'). It is always recommended using disposable devices with self-management (closed plastic bags) to contain the secretions if any is expelled.

### Ethical approval

The conducted research is not related to either human or animal use.

### Disclosure statement

No author has any financial interest or received any financial benefit from this research.

### Conflict of interest

The authors state no conflict of interest.

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