

## Letter to Editor: Pulmonary Rehabilitation: A Recommendation for People in Quarantine of COVID-19



Majid Ravanbakhsh<sup>1</sup> , Azar Behnamfar<sup>1\*</sup> 

1. Musculoskeletal Rehabilitation Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.



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### Dear Editor

At the end of 2019, Severe Acute Respiratory Syndrome (SARS) of coronavirus 2 (SARS-CoV-2) emerged in Wuhan, Hubei Province, China, and infected over 16 million people around the world. Individuals with coronavirus disease 2019 (COVID-19) have an influenza-like illness and respiratory tract infections. We can categorize patients in three main groups: asymptomatic infected cases, patients with mild upper respiratory tract illness, and patients with severe viral pneumonia with respiratory failure. According to reports, almost 80% of cases are asymptomatic or show mild symptoms, 15% have severe symptoms, and the other 5% are critical cases requiring ventilation and life support [1, 2].

In this document, we discussed the importance and necessity of pulmonary rehabilitation and its benefits for people in quarantine, including healthy individuals, cases with mild COVID-19 infection, or transmitters of the virus with no symptoms to prevent respiratory system-related side effects and complications of COVID-19. Because COVID-19 affects the respiratory system, training, and rehabilitating this system is the priority, which could be beneficial for both healthy and infected individuals. Although there is no certain treatment for this disease and the effect of pulmonary rehabilitation on COVID-19 is unknown, because everyone can train their respiratory sys-

tem by doing some easy respiratory exercises with the minimum cost at home and their effectiveness on other prevalent dysfunctions (postural dysfunctions, musculoskeletal pains, myofascial trigger points, etc.) and similar respiratory system-related diseases has proved, they are recommended for people in quarantine. On the other hand, anyone potentially can become a severe case requiring ventilation and life support suffering from respiratory side effects of mechanical ventilation (ICU-acquired weakness, reduction in health-related quality of life, neuromuscular dysfunction, reduction in diaphragm thickness, etc.) [3].

Pulmonary rehabilitation gives us a better chance of preventing or at least minimizing these complications. Regarding symptoms, pulmonary rehabilitation is done for removing airflow obstruction, mucus clearance, controlling dyspnea, expanding the lungs to the maximum capacity, repairing exercise performance, and improvement of quality of life. Airway clearance techniques, breathing exercises, and breathing retraining are physiotherapy interventions that have been effective in similar diseases [4].

To train the respiratory system in healthy subjects, it has been shown that inspiratory muscle training combined with strength and endurance exercises for peripheral muscles, improved inspiratory muscle strength and endurance, increased lung volumes (that is decreased in COVID-19 patients) and diaphragm thickness (that is decreased in long-time ventilated patients), and

**\* Corresponding Author:**

**Azar Behnamfar, PhD.**

**Address:** Musculoskeletal Rehabilitation Research Center, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran.

**Phone:** +98 (991) 2899634

**E-mail:** aazarbehnamfar@gmail.com

improved exercise capacity (that is impaired in COVID-19 patients) [5]. Considering the similarities of this disease with restrictive lung disease, such as pneumonia [6], gaining the full expansion of the lungs and maximum respiratory muscle strength should be highly considered. On the other hand, in severe cases, when the patients suffer from increased sputum and pulmonary secretion, having stronger respiratory muscles is more effective in airway clearance techniques, and consequently in patients' survival.

Respiratory rehabilitation for non-acute infected cases is necessary for regaining mobility, strength, and more importantly for clearing airways and preventing disease progression and acute respiratory distress syndrome (ARDS). In COVID-19 recovered patients with no ARDS, it has been observed that lung abnormalities on chest CT scans have the greatest severity until the days 10-14 [7]. They start with small subpleural ground-glass opacities and grow larger with crazy-paving pattern and consolidation. After the peak, they are suppressed and leave large ground-glass opacities and subpleural parenchymal bands.

Because radiography and CT scan of the infected patients have revealed that most of the abnormalities were peripheral consolidations [8], and also reducing the degree of lung function secondary to inactivity can result in a reduction in lungs full expansion, lung volume, and muscle weakness, which in turn cause a further prohibition to exercise, and because most people do not train and use the more peripheral parts of their lungs [9, 10], there may be an association between these observations. It can be hypothesized that if people retrain the more peripheral parts of their lungs, as the weakest and the most susceptible parts to get involved, they can reduce the chance of becoming a severe case; however, further investigations are needed. This deconditioning can be cured by pulmonary rehabilitation and will be trailed by improvements in exercises increasing lung capacity and health-related quality of life.

However, we do not know much about COVID-19. We can only compare it with other similar diseases and recommend medical approaches that seem logically effective. The certainty of the suggested approach must be proved. Our recommendation for people in quarantine is trying to train the respiratory system and increase lung expansion capacity, which will be certainly helpful for people's respiratory system's health.

## Ethical Considerations

### Compliance with ethical guidelines

There were no ethical considerations to be considered in this research.

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### Authors' contributions

All authors contribute in preparing this article.

### Conflict of interest

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