

## **Respiratory Muscle Exercises May be Effective at Reducing the Symptoms of COVID-19**

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### **Abstract**

1. COVID-19 shows similar symptoms, such as cough, fever, dyspnea, chest tightness, pain and myalgia-weakness, pneumonia, acute respiratory distress syndrome, etc.
2. Respiratory muscle exercises shows significant increments in pulmonary functions and lung volumes, cough capacity and efficiency, dyspnea, respiratory distress syndrome, pneumonia, perception of breathlessness, bronchiectasis, bronchial asthma, hypoxemia, chest tightness and myalgia-weakness, chronic airflow limitation, etc.
3. Given the impact of the current worldwide pandemic, any positive impact afforded by the introduction of respiratory muscle exercises would be rapid and potentially effective intervention.

**Keywords:** *Severe Acute Respiratory Virus Syndrome-Coronavirus-2 (SARS-CoV-2); Coronavirus Disease 2019 (COVID-19)*

A new coronavirus emerged in December 2019 in Wuhan, Hubei Province, China. The virus, severe acute respiratory virus syndrome-coronavirus-2 (SARS-CoV-2), was first identified in throat swabs of patients [1]. The disease has since been named coronavirus disease 2019 (COVID-19). Since the initial detection of SARS-CoV-2, sporadic imported cases among travelers returning from Wuhan and cases secondary to human-to-human transmission have been reported within China [2,3]. This disease has since become a worldwide pandemic.

SARS-CoV-2 is the etiologic agent of severe respiratory illness, similar to what was observed in response to other coronaviruses, notably SARS-CoV [4]. The main clinical manifestations of COVID-19 are cough, fever, and dyspnea [5,6]. Although the final diagnosis relies on detection of specific viral nucleic acids, both the World Health Organization and CDC guidelines indicate that chest radiography is an essential component of primary management of this disease [7,8]. SARS-CoV-2 spread is facilitated by close person-to-person contact via respiratory secretions, including coughing or sneezing, similar to that observed for influenza and other respiratory pathogens. People with cardiopulmonary dysfunction, weakened immune systems, infants, and older adults are among the groups more prone to severe disease [9].

### **2019-nCoV shows similar symptoms:**

- Main symptoms; cough, fever and dyspnea [5,6], chest tightness, pain and myalgia-weakness [4].

- Common symptoms; acute respiratory distress syndrome [2], consolidative peripheral opacities with ground-glass density, focal consolidation, lobar consolidation and patchy consolidation in lungs [2,4,10-12], subpleural lesions [7,10-12], severe dyspnea [2], sneezing and sore throat [13], lower-respiratory tract ailments, such as pneumonia or bronchitis [9], hypoxemia [4], sputum production [2], RNAemia [7].
- Uncommon symptoms; diarrhoea [14], gastrointestinal illnesses [1], headache [2], haemoptysis [2], acute cardiac and kidney injury [2].

Recent studies on the effects of respiratory muscle exercises showed significant increments in pulmonary functions and lung volumes [15-20]. Also some studies showed improvement in cough capacity and efficiency [21-23], dyspnea [24-27], respiratory distress syndrome [28], pneumonia [21,29], perception of breathlessness [30], bronchiectasis [31], bronchial asthma [32-34], hypoxemia [35], chest tightness and myalgia-weakness [36], functional capacity after chronic heart failure [37], chronic obstructive pulmonary disease [38-40], chronic airflow limitation [41], neuromuscular disorders [42,43], cystic fibrosis [44] after respiratory muscle works.

Exercises that focus on the respiratory muscles, such as inspiratory muscle strength, endurance, and warm-up exercises with related devices [15,-17,38,45-48], diaphragmatic breathing exercises [49-51], positive pressure breathing [52,53], deep breathing [49,54] etc., may be effective at reducing some of the major and most common symptoms of COVID-19. In addition, it could be considered that more significant improvement may be found in inspiratory muscle exercises with devices. Experiments will be needed to examine the specific impact of respiratory muscle exercise on the course and severity of disease. Given the impact of the current worldwide pandemic, any positive impact afforded by the introduction of respiratory muscle exercises would be rapid and potentially effective intervention.

### Author Contributions

M.Ö. conceived the idea, study design, literature search, interpreted data and contributed to writing.

### Conflict of Interest

Author has no conflicts of interest to declare.

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