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Exercise in COVID-19: Intensity and Timing

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Dear editor,

COVID-19 outbreak around the world raises concerns about patient management, particularly in the critical care setting (1, 2). Conventionally, bed rest had been suggested for patients following flu-like syndromes, and therefore, this concept could be applied for covid-19 infection. Accordingly, one might have hypothesized that bed rest could be beneficial for COVID-19 patients, particularly in the acute phase. Our experiences at the bedside showed some findings in this regard because we observed that the patient's condition had deteriorated and oxygenation level decreased soon after moderate activity. In the symptomatic phase, the patients might take advantage of short periods of bed rest. It seems that exercise would have mental and physical advantages for patients in the first days of infection (3). Also, Pieces of evidence about COVID-19 home confinement suggested that low/medium intensity high volume exercise, and decreasing the calorie intake by 15 to 25 percent could prevent the harmful consequences of sedentarism (4). In terms of cellular and molecular, Moderate exercise in the early stages of infection can reduce pulmonary cellular infiltration and a shift from a T-helper 1 to a T-helper 2 index (5, 6). Reducing symptoms, inflammatory factors, virus load, and inflammatory cytokine level is associated with persistent exercise. Then, acute exercise could be beneficial, which is limited to the primary phase of infection. Consequently, it could reduce the viral load, mitigate cytokine storm, shorten the sectional acute phase, and accelerate recovery (7). However, there are no randomized controlled trials in the field of COVID-19; and then, more studies are required. Also, mild exercise could improve the autophagy mechanism (8) which ameliorates the function of the immune system in response to COVID-19 infection.

It is hypothesized that COVID-9 patients might represent two phenotypes as follow (9): Type L (Low elastance i.e. high compliance, ventilation-to-perfusion ratio, lung weight, and recruitability), and Type H (High elastance, right-to-left shunt, lung weight, and recruitability). At the first stage, COVID-19 pneumonia demonstrates L type phenotype; these patients might stay without any changes for some time and later on could improve or exacerbate. Over time, as shortness of breath develops, a transition from L type to H type occurs due to high-stress ventilation. In high elastance, low tidal volume is required for ventilation, and therefore, high tidal volume and respiratory effort seem to be deleterious and hazardous. In the inflammatory phase specifically in H-type patients (COVID-19) intensive deep breathing could cause pulmonary epithelial injury. Accordingly, for hospitalized patients, especially in the intensive care unit, respiratory physiotherapy is requested. In the case of pulmonary involvement (ARDS), all efforts should be focused to reduce trans-pulmonary pressure, pulmonary edema, and, probable lung injury. Therefore, a low tidal volume strategy is performed in mechanically ventilated patients with low compliance in order to prevent shear stress. In the inflammatory phase of the disease, it seems that high tidal volume and high transpulmonary pressure could be injurious; therefore, it might be the case in spontaneous breathing. Perhaps forcing the patient to take deep breaths (Similar to what happens in sports) or provoking a severe cough in the inflammatory phase may increase the damage. Therefore, at this stage, it is better for the patient to be more relaxed, and to compensate for this immobility, an anticoagulant should be prescribed (10) to the patients under the guidance of a d-dimmer (prophylactic, mild dose, or moderate dose).

Bearing in mind, at the inflammatory phase, intensive exercise, and particularly without the supervision of an expert physical therapist is not beneficial at all and even

could be considered as a second hit phenomenon. Mild exercises in bed rest period (i.e., acute phase) could prevent the probability of coagulation in pulmonary capillaries and deep vein thrombosis (11). It might lead to health promotion in COVID-19 infected patients.

Footnotes

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