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# Exercise for Maintaining Immunity during the COVID-19 Pandemic

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Abstract

Immune strength is one of the vital factors when a specific medicine or vaccine has not been developed. Although people may not be exercising enough owing to the “Stay Home” policy aimed at preventing the spread of infection, the decrease in daily physical activity will lead to increased incidence of metabolic syndrome and chronic inflammation. On the other hand, exhaustive exercise/training induces stress hormones and immunosuppressive cytokines, both of which reduce immune functions. Therefore, exercises aimed at enhancing immune strength should be of moderate intensity, ranging from light-intensity exercises to those that border on getting individuals out of breath within an hour; they are to be practiced more than three times per week for physical training adaptation.

Mini Review

When a specific medicine or vaccine has not yet been developed, immune strength is one of the vital factors affecting the risk of development of coronavirus disease 2019 (COVID-19), which is presently a global pandemic. Although people may not be exercising enough owing to the “Stay Home” policy aimed at preventing the spread of infection, the decrease in daily physical activity and excessive eating will lead to further aging and increased incidence of metabolic syndrome and sarcopenia [1]. The correlation between obesity or decrease in physical fitness and the current COVID-19 crisis is attracting media attention [2], but the lack of exercise is a significant issue from the viewpoints of disease control and maintaining immune strength because the decrease in physical activity may lead to the decrease in immune strength [3, 4].

There are various forms of exercises, ranging from low-intensity exercises such as walking and yoga to marathon running. Although strenuous exercises stimulate the secretion of stress hormones and immunosuppressive cytokines such as interleukin (IL)-1 receptor antagonist and IL-10 [4, 5], excessive performance of such exercises would lead to a decrease in the immune strength [6]. It is, therefore, desirable from the immunity viewpoint to exercise moderately: an appropriate level of exercise intensity to prevent development of fatigue or muscle pain, a sufficient duration of rest for recovery, and optimal fluid and nutritional supply are recommended as well for preventing dehydration and heat illness [7].

When we gradually increase the intensity of exercises, we may run out of breath abruptly at a certain point, which is technically called a Ventilatory Threshold (VT) or Anaerobic Threshold (AT). It is an internal bodily condition of oxygen starvation that results when breathing is not adequate for meeting the oxygen demands of the body during exercise. When this happens, the body secretes stress hormones such as catecholamine (adrenalin and noradrenalin) and adrenocortical steroid (cortisol) endogenously to enhance respiration, circulation and metabolism; however, these stress hormones suppress immunity, and hard exercise/training sometimes results in respiratory infections [6] and systemic inflammation called as cytokine storm [4,5].

Therefore, moderate exercises performed for enhancing immune strength should not be too intense to the extent that an individual runs out of breath, and the exercise duration should be less than an hour at an optimum pace (smiling pace) to prevent a build-up of fatigue and systemic inflammation. This will maintain the stress hormone and cytokine secretion at the minimum, and the immune strength will not decrease even though pathogens are aspirated during exercises. However, individuals who do not exercise or have decreased physical fitness levels should start with light exercises, such as warming-up exercises, and gradually prepare themselves physically to prevent injury and inflammation [8,9].

Regarding exercise frequency, exercise performed three times per week should be sufficient to enhance the aerobic capacity to build up a fatigue-resilient body. Any type of exercise is suitable as long as the participant is happy while performing it for habituation. At the same time, exercises that involve as many muscles in the body as possible are recommended because muscle contractions improve blood and lymph circulation as is called as muscle pump, and this optimally distributes immune cells to the entire body, promoting immune surveillance to find out and kill pathogens or cancer cells lurking in the body tissues. The detailed review is providing practical guidelines during the COVID-19 quarantine period [10].

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