



## Original Article

## The Role of Physical Activity in the Immune System: Its Prevention and Control of the Consequences of Viral Diseases Especially Coronavirus

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The body is always under attack by viruses, bacteria and parasites. A virus that emerged in the late December 2019 is a new coronavirus called SARS-CoV-2 (Severe Acute Respiratory Syndrome). It started its outbreak has pneumonia in China's Wuhan (Hanan Seafood Market), which has now posed major health threats to the world's public health [1]. Sedentary lifestyle and lack of movement have occurred as consequences of stay-at-home recommendations for curbing further spread of the disease. Physical and mental illnesses can come to the scene if the disease persists [2]. It should be noted that the body is constantly evolving its various systems to fight off a variety of viruses and acquiring complex mechanisms to defend against these invasive agents.

One of the vital systems of the body, which is also highly involved in coronavirus disease, is the immune system. The body's immune system identifies attacks and removes elements that are considered alien to the body, thereby preserving the body's homeostasis [3]. Normally, there are 5 types of white blood cell namely neutrophils, eosinophils, basophils, lymphocytes and monocytes,

each with a specific defense and phagocytic role and some with viruses, which fight infections and pathogens.

Research shows that many environmental factors affect, prevent and control the immune system, physical activity being a prominent factor [3]. Many studies in the field of immunology have addressed the effects of different types of physical activity on the immune function [4]. The preventive factors for physical activity include the fear of weakening the immune system during and after physical activity and having not enough space available for the physical activity as well as lack of enough information regarding the type and intensity of the physical activity.

Given the contradictory findings in some contexts, there was general agreement that the exercising brings many benefits to the immune system and abundant research has emphasized that long-term, intense exercise may suppress or weaken the system. Immunogenicity [5] and on the other hand, findings from various studies confirm that low to moderate activity enhances immune function and decreases the risk of infection but is likely to reverse moderate to vigorous activity. In fact, with heightened immune activity the risk of infection increases [6]. While there are other contradictory results, epidemiological studies generally support the idea that the risk of upper respiratory tract infection is high during heavy training

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sessions or during a week or two of competitive endurance competitions [7], while there is further evidence that regular physical activity increases resistance to infection in cold ambient conditions or upper respiratory tract infection [8].

It has been shown that many components of the immune system change after physical activity [9]. One of the most important factors in achieving controversial results in these studies is the type, intensity, duration and frequency of exercise that cause different changes in immune system function. Concerning the type of exercise, recent research has pointed to the role of combined physical activity in improving the immune system, especially in sedentary individuals [10].

Based on the consensus of the researchers, it can be concluded that exercising up to 50 to 75% maximum power Or  $\dot{V}O_{2,max}$  and up to a maximum of 30 to 45 minutes per day can have positive effects on the immune function. Exercise improves cardiovascular health by maintaining and improving immune function indices to some extent [5,11], making the immune system respond well to coronary artery disease. There are other health benefits for physical activity including amelioration of depression, anxiety, self-esteem, general health, quality of life, lifestyle and other mental and psychological conditions [12]. In order to prevent and control the occurrence of the virus, especially the coronavirus, as well as controlling the spread of the virus as an effective solution during home quarantine or stay-at-home , light- to moderate-intensity physical activity can be recommended [11]. Regarding high-intensity workouts, if there is a break between training sessions and proper nutrition, such exercises can also help maintain and improve the immune system [13].

Following, as recommendations for staying home to prevent the onset of Coronavirus Disease have been made available to different segments of the community, As a solution to maintain and improve physical fitness, immune system, and mental conditions, it is recommended to design and implement light to moderate exercise at home with body weight or with portable tools [such as dumbbells, household items such as tables, chairs, bottles, cans, backpacks, etc.] [2]. It is also possible to benefit from pre-designed videos and exercise programs by sports science experts.

Doing physical activity, whether at home quarantine or staying at home for a long duration, at gyms or insport places, can be helpful as a preventative and controlling factor for viral illnesses, especially coronavirus. In this regard, Duggal et al found that exercise improves immune responses to influenza and pneumococcal vaccines in older adults [14]. In addition, physical activity as a preventative factor can be very effective in controlling the repercussions of the sedentary jobs and also affect

physical and mental health [2, 12].

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