



# **Significance of Immune System to Fight COVID-19 and its Co-relation with Physical Exercise and Nutrition**

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## **Authors' contributions**

*This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.*

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## **ABSTRACT**

The proliferation of covid-19 has caused extensive damage worldwide and brought global movement into a state of complete stagnation. By the year 2019, another type of infection came into the world knowledge that followed its origins in the bats of Wuhan, China. Coronavirus was declared a global epidemic by the World Health Organization and thinks that the Earth is fighting the inevitable danger posed by humans. As we may be aware that this infection is a new phenomenon, so no vaccines or drugs are available for treatment and the medication currently being used gives our body time to build up its defenses against COVID-19. Immune system is a combination of different organs and cells where each person performs their function in a consistent manner to protect the host from any non-particulate matter for example infections, microbes, growths, parasites, etc. Our body needs a large variety of micro (such as sugar, protein,fats) add to the synthesis of different types of safe

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cells. In this article, I have tried to explain the role of the immune system in the fight against covid-19 virus and how exercise and proper diet can help build strong immune systems.

*Keywords: COVID-19; Immunity; exercise; nutrition.*

## 1. INTRODUCTION

The COVID-19 pandemic is wreaking havoc and killing people all over the world. Overall, steps are being taken to prevent human-to-human transmission and improve overall health [1-2]. Pleasant removal and separation affect the public's way of life and well-being. A solid host-safe reaction to the novel Covid is a critical factor for avoiding infection and avoiding reaching the most severe stages of the illness [3]. Pathophysiology and the human insusceptible reaction to comparable Covids have recently been depicted as new territories. Covid has particular clinical stages identified with the invulnerable reaction [4]. In this article, I would be exploring that how immunity plays a pivotal role in fighting against the virus and how factors like exercise, nutrition, etc help build strong immunity [5]. Exercise additionally mitigates the adverse consequences of confinement including pressure, tension, and sedentary, all of which further lessens invulnerability and increments non-transmittable infection hazard [1,6]. Well-qualified assessment Improving host invulnerability and alleviating the adverse consequences of detachment using actual work is unequivocally advocated. During the current pandemic, which is a healthy, psychologically, and socially challenging environment in the presence of a disruptive viral living being, exercise should be performed in moderate forces and volumes. Making proactive healthcare advancement models of creativity and government support based on the latest available evidence should be encouraged to reduce real latency during the ongoing COVID-19 pandemic.

## 2. HOW COVID-19 IMPACTS THE HUMAN BODY

Coronavirus has received people through a spillover, a characteristic cycle whereby a creature microorganism develops and gets able to infect, reproduce and transmit itself inside the human species [5]. This developmental process is discovered mostly in RNA infections, for instance, Covids once they have a better chance of recurrence than DNA infections. A single-

stranded linear RNA-RNA genome with a positive extremity of 27–32 Kb is found in Covids they're circular virions with a width somewhere within the range of 80 and 220 nm shaped by a phospholipid envelope, the pericapsid, which has distal projections considered peplomers that give the infection a crown appearance. These infections comprise of varied proteins: (i) protein N (50–60 kDa ) balances out RNA; (ii) glycoprotein S (80–220 kDa ) structures prepolymer, which favor the assault of the infection and combination with the host's cell layer; (iii) glycoprotein M (20–30 kDa ) connects with the nucleocapsid; (iv) protein E (9–12 kDa) may be a constituent of the envelope and cooperates with the glycoprotein M to invigorate growing; (v) hemagglutinin-HE (120–140 kDa ) is engaged with the arrival of the infection. From a genotypic and serological composing, CoVs are separated into four classifications:  $\alpha$ ,  $\beta$ , G, and  $\delta$ . Furthermore, the  $\beta$ -CoVs are partitioned into four different ancestries A, B, C, D. These infections can cause an assortment of respiratory conditions, going from the traditional virus to Middle Eastern respiratory disease (MERS) to serious respiratory condition (SARS) the foremost well-known indications are fever, migraine, hack, breathing challenges, and looseness of the bowels. Now and again, these indications may stay quiet; on the opposite, the looks are vicious to the aim of causing serious pneumonia, dyspnea, renal disappointment, and even demise Patients generally powerless against contaminations have previous sicknesses, including diabetes, hypertension, cardiovascular illness, and ongoing aggravation of the upper respiratory lot (URTI) [3,7].

During infection diseases, the host enacts the insusceptible framework to battle the pathogenic microorganism. A crazy invulnerable reaction may happen during a vicious disease, for instance, COVID-19, bringing about generous lung tissue harm. during this situation, a couple of researchers keep brooding about whether the arranged active work could weakness or favor the flourishing of the pathology incited by COVID-19. The motivation behind his audit is to reveal insight into how, during COVID-19

diseases, the proper working of the human insusceptible framework are often impacted

### **3. ROLE OF IMMUNE SYSTEM IN FIGHTING COVID-19**

The system may be a complex system of cells, tissues, and organs with specific functions. Immune circulating molecules recognize and eliminate foreign agents: (bacteria, parasites, fungi, viruses, cells infected with pathogens, and cancer cells). The system implements two sorts of defense: natural immunity and or immunity [4].

#### **3.1 Boosting Immunity-Role of Exercise**

The human system can be a complex web of cells and molecules that work together to keep the host in a safe state. Exercise is believed to have a profound effect on the functioning of \*\*\*\*\*. In a variety of disease regions, including cancer, \*\*\* infection, diabetes, and mental retardation, advanced age and adjusted body mass index, and exercise routines that generally meet ACSM recommendations, have been shown to increase immune responses to vaccination, chronic low back pain, and exercise improve various physical symptoms. The current COVID-19 epidemic has raised questions about how exercise can increase the immune system and keep us safe from infection. When large numbers of people close to gyms and parks, where we can exercise and participate, it is restricted, this is especially appropriate. This problem is exacerbated by the negative effects of well-documented exclusion and imprisonment. Glucocorticoids, such as cortisol, are produced in large quantities during periods of isolation and inhibition, and can disrupt many important functions of T-cell's ability to replicate in infectious responses is greatly reduced when we are nervous, as is the ability of certain active lymphocytes (e.g., NK cells and CD8 + T-cells) to detect cancer cells in our bodies. To prevent germs and other infections from developing, our immune cells must retain their ability to reproduce so that they can 'navigate' the vulnerable regions of our body (e.g., the upper lip as well as the lungs). When we are sick, this treatment is always important to reduce the impact of the virus and speed up the resolution of the virus [1].

In this case, we must strive to stay within the recommended performance standards. Exercise has been shown to have a strong effect on body cells and metabolites, as well as to convert unwanted substances for reduction and inhibition

into various forms of immunity. Although there is no scientific literature on the impact of exercise on coronaviruses, there is evidence that exercise can protect the owner from other infections such as the virus, the flu, rhinovirus (another common cause of the flu), and herpesviruses such as Epstein-Barr (EBV), varicella-zoster (VZV), and Herpes simplex-virus-1 (HSV-1). Jeff Woods Lab at the University of Illinois has found that physical fitness saves mice from death during a live flu outbreak. It also contributes to the formation of beneficial immune systems and the conversion of cytokines into the lungs, all of which are linked to improved longevity. Our research focuses on how exercise can reduce the negative effects of stress on physical activity, especially during a set period of separation and confinement, such as space travel. During the six-month mission to the International Space Station, we found that astronauts with pre-flight fitness fitness and reduced muscle stimulation had little chance of regenerating EBV and VZV. The astronauts were in better condition and had copies of the EBV virus in the lower EBV virus, meaning their ability to infect others also diminished. In addition, astronauts who returned to Earth in poor pre-flight health and advanced stages of heart failure may be able to reactivate the outbreak. Recurrence of the virus can be a sign that our immune system is at risk, which we believe is largely due to the stress associated with isolation and depression in this sense. According to the report, exercise can be an important way to combat stress to help maintain physical activity and reduce the risk of infection, in addition to the above direct effects on cells and molecules in the body.

#### **3.2 Boosting Immunity:-Role of Nutrition**

The significance of diet in the system's development and maintenance cannot be overstated. Nutritional deficiencies will weaken the immune system and make you more susceptible to infections. Instead, knowing your nutritional condition will help you avoid diseases and immune deficiency [8].

To function optimally, all cells, including those inside the environment, need adequate and proper nutrition. An "enabled" process increases the energy demand even more during sickness, with higher basal energy consumption during fever, for example. Thus, for the most simple immunological results, optimal nutrition would be nutrition that facilitates immune cell functions, helping them to activate active responses against

pathogens while also allowing them to resolve the reaction rapidly when needed and preventing any underlying chronic inflammation. To satisfy the immune system's demands for energy and nutrients, exogenous sources, such as the diet, or endogenous sources, such as body stores, are often used. Any micronutrients and dietary ingredients play unique roles in the long-term growth and maintenance of a stable system, as well as the elimination of systemic inflammation. For example, the aminoalkanoic acid arginine is needed for macrophage gas output, and the micronutrients vitamin A and zinc, which control cellular division, are required for the system's strong proliferative response [6].

It is well recognized that undernutrition, whether as a result of food shortages or famines in developing countries or malnutrition arising from cycles of hospitalization in developed countries, has an impact on immune function. The severity of the deficiency, the presence of illness, and other considerations will all affect the severity of the impairment [9]. Vitamin E, which serves as an antioxidant, inhibits protein kinase C activity, and can interfere with enzymes and transport proteins [10], is an example of a nutrient that may have several immunological consequences. A lack of a few micronutrients has also been related to compromised immune responses. Iron supplementation, for example, can improve morbidity and mortality in malaria-endemic areas. Furthermore, since diet can successfully cure immune deficits caused by insufficient intake, there is a lot of curiosity about whether certain nutrients can benefit.

Balance to natural and consistent physiological responses, characterized mainly by mutations such as cytokine storm and lymphopenia, is one of the factors known to be linked to the worst prognosis of infection, in addition to the lack of cold- and radio-related conditions such as obesity, metabolic syndrome, and immunconception (immobolic syndrome) [8].

The effects of exercise - both normal and inadequate - of a respiratory infection program such as COVID-19 include an increase in vigilance and immunity, which helps control pathogens, an undeniable fact that is especially important when considering immune dysfunction and the elderly human tendency to severe infection. Prevention of obesity or weight loss, increased physical and cardiopulmonary status, reduction of systemic pro-inflammatory and pro-

thrombotic status, reduction of oxidative stress, improvement in glycemic, insulin, and lipidic metabolism, and improved policy responses are all examples of a positive impact on dynamic capture [3].

In the case of the COVID-19 epidemic, the use of preventive measures is an important strategy to reduce the risks associated with the novel coronavirus infection. Personal protective equipment (PPE), adherence to standards of behavior, isolation, and other activities that promote good health, eliminate conflict, and strengthen the immune system are among these methods.

Maintaining appropriate righteous standards in the area of content and social exclusion, on the other hand, continues to be difficult, emphasizing the importance of developing programs with instructions that have been adapted to a new public process. There are, fortunately, other effective ways of doing exercise in confined spaces, enabling the public to benefit from exercise [11-14].

Finally, future studies that are in-depth research into the link between exercise and SARS-CoV-2 infection, including the effects of exercise-induced and immunological effects found on COVID-19, will undoubtedly be significant, given the aforementioned benefits and global outcomes. all infected with the novel coronavirus of the novel. Faced with the possibility of new epidemics caused by small, unpredictable events, and in the absence of fully effective immunizations, vaccines, or specific therapies that show effectiveness, the body's immune system becomes the most important line of defense, emphasizing the value of a healthy lifestyle like yoga [1].

#### **4. CONCLUSION**

A lack of a few micronutrients has also been related to compromised immune responses. Iron supplementation, for example, can improve morbidity and mortality in malaria-endemic areas. Furthermore, since diet can successfully cure immune deficits caused by insufficient intake, there is a lot of curiosity about whether certain nutrients can benefit.

#### **CONSENT**

It is not applicable.

## ETHICAL APPROVAL

It is not applicable.

## COMPETING INTERESTS

Authors have declared that no competing interests exist.

## REFERENCES

1. Zaki AM, Van Boheemen S, Bestebroer MT, Osterhaus A. D Faced with the possibility of new pandemics caused by previously unknown microorganisms, and in the absence of completely successful preventive measures, vaccinations, or specific therapies of demonstrated efficacy, the host organism's capacity to fight pathogens becomes the most critical line of protection, stressing the value of engaging in healthy lifestyle behaviors such as yoga..M.E.; Fouchier, R.A.M. Isolation of a novel coronavirus from a man with pneumonia in Saudi Arabia. *N. Engl. J. Med.* 2012;367:1814–1820. [CrossRef] [PubMed]
2. Buran T, Sanem Gökçe Merve Kılınç, & Elmas Kasap. Prevalence of Extraintestinal Manifestations of Ulcerative Colitis Patients in Turkey: Community-Based Monocentric Observational Study. *Clinical Medicine and Medical Research.* 2020;1(2):39-46. Available:https://doi.org/10.52845/CMMR/2020v1i2a8
3. Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, Xiang J, Wang Y, Song B, Gu X, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: A retrospective cohort study. *Lancet.* 2020;395:1054–1062. [CrossRef]
4. World Health Organization. Middle East Respiratory Syndrome Coronavirus (MERS-CoV); 2020. Available:https://www.who.int/health-topics/middle-east-respiratory-syndrome-coronavirus-mers#tab=tab\_1 (accessed on 19 January 2020)
5. Daniel V, Daniel K. Diabetic neuropathy: new perspectives on early diagnosis and treatments. *Journal of Current Diabetes Reports.* 23020;1(1):12–14. Available:https://doi.org/10.52845/JCDR/2020v1i1a3
6. Scudiero O, Brancaccio M, Mennitti C, Laneri S, Lombardo B, De Biasi MG, et al. A Novel Approach in the Fight against Skin Colonizing *Staphylococcus aureus*. *Antibiotics* 2020;9:198. [CrossRef]
7. Rodriguez-Morales AJ, Bonilla-Aldana DK, Balbin-Ramon GJ, Rabaan AA, Sah R, Paniz-Mondolfi A, Pagliano P, Esposito S. History is repeating itself: Probable zoonotic spillover as the cause of the 2019 novel Coronavirus Epidemic. *Inez. Med.* 2020;28:3–5.
8. Daniel V, Daniel K. Perception of Nurses' Work in Psychiatric Clinic. *Clinical Medicine Insights.* 2020;1(1):27-33. Available:https://doi.org/10.52845/CM/2020v1i1a5
9. Daniel V, Daniel K. Exercises training program: It's Effect on Muscle strength and Activity of daily living among elderly people. *Nursing and Midwifery.* 2020;1(01):19-23. Available:https://doi.org/10.52845/NM/2020v1i1a5
10. Kumar H, Kawai T, Akira S. Pathogen Recognition by the Innate Immune System. *Int. Rev. Immunol.* 2011;30:16–34. [CrossRef]
11. Daher KA, Selsted ME, Lehrer RI. Direct inactivation of viruses by human granulocyte defensins. *J. Virol.* 1986;60:1068–1074. [CrossRef]
12. Available:https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7387807/
13. Available:https://www.tandfonline.com/doi/full/10.1080/14787210.2020.1794818
14. Available:https://link.springer.com/article/10.1007/s10238-020-00650-3

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