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Review article

Effect of Social Distancing on Immune System in Fighting with SARS COVID-19

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ABSTRACT

Recently, the world health organization, governments, and public health experts have highlighted the potential importance of social distancing because of COVD-19 that are beneficial for the host. Coronavirus is pandemic of respiratory illness that transfer from one person to another person through cough, sneezing, mouth droplets and touching. Asymptomatic, mildly symptomatic and pre-symptomatic are three types of coronavirus. It spread fast in the whole world. Although there is no vaccine is available in the market for coronavirus while strengthening the immune system also keeps the virus away from the host. Innate, adaptive and passive immunity has power to kills infected cells. It's done by a cytokine storm of the adaptive immune system. Though health experts say that loneliness and self-isolation cause stress which ultimately sends your immune system into exploit but in pandemic days it will be beneficial.

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INTRODUCTION

Coronavirus is a family of viruses showing crown like spiked proteins on the top of the virus surface under microscope is known as coronavirus. SARS-CoV-2 (Severe Acute Respiratory Syndrome coronavirus-2) disease also named as COVID-19 (Corona virus disease 2019) by World Health Organization that first emerged in China and then become a global problem. It is a worldwide pandemic of respiratory illness, called COVID-19. There are different kinds of coronaviruses of which 4-5 types cause common diseases among humans everything from common cold to mild and moderate respiratory illness. Some of them cause diseases in animals and jump from animals to human's species. In 2019, a novel kind of coronavirus started rapidly spreading in humans and getting a lot of attention nowadays because this is new kind of coronavirus never seen before among humans. Some theories say that it is an

animal virus and have jumped from animal species to human population and begun spreading. Many people are being die due to this disease.

Coronavirus and Vaccination

The most effective means to combat diseases is through vaccination. Different diseases can be prevented through vaccination. A vaccine assists our immune system to identify and resist pathogens like bacteria and viruses that make us safe from diseases. More than 25 weakening and life alarming diseases like cervical cancer, polio, diphtheria, measles, meningitis, tetanus, influenza and typhoid etc. Currently, 25 million children are not getting vaccines on time so it is risk of serious diseases like ill health, disability and death [1]. If we want to know about vaccination mechanism then we should know about how does the immune system work? Because vaccines control the natural activity of our immune system. Our body harbor billions and trillions of bacteria and viruses. Some of these bacteria and viruses are beneficial for us and some cause diseases by getting inside our bodies and multiplying. Our immune system will quickly perceive them as attackers because proteins and sugars on bacterial surface are different from the proteins and sugars made in human body. Many white blood cells start different chain events. Some white blood cells start making antibodies to combat against viruses and bacteria. These antibodies bind with bacteria's surface having specific proteins, kill or disabled the attackers. It's just liked a key fitting a lock [2]. Production of antibodies with specific shape will take some days. When these antibodies become ready, these will bind to the antigens i.e. bacteria and viruses. In this way we get rid of the diseases. Remaining antibodies become mixed in the blood and some converted to memory cells. If these germs again attack and our immune system rapidly respond so we cannot get ill [2,3].

Vaccine also has same mechanism of application. It has dead and weak species of bacteria and viruses. The same thing happens with real bacteria or viruses when these get inside in our bodies [4]. Later on, if we get infected again with these germs. Our immune system will recognize it and kill before them before we know about these germs [3].

Types and Spreading of Coronavirus

Usually corona virus spread through mouth droplets, touching, sneezing and coughing. The incubation period of this virus is about 2 to 14 days and its range of symptoms from mild to severe depending upon the immunity level of the person [5]. There are three type of virus: Asymptomatic (asymptomatic means infection present in host but no symptoms and will not develop them later), mildly symptomatic (flue-like symptoms, mild fever and dry little cough or may be not), or pre-symptomatic people (pre-symptomatic means infection present in host but don't have any symptoms yet) [6,7]. The virus spread internationally within 60-70 days after the first identification, and was transmitted via close human-to-human contact. The outbreak has caused governments in various countries to take swift and protective measures. In China, these included putting cities on lockdown, implementing travel warnings/bans and cancellations, extending national holidays, and closing schools and postponing classes.

Exercise at home using various safe, simple, and easily implementable exercises is well suited to avoid the airborne coronavirus and maintain fitness levels. Such forms of exercise may include, but are not limited to, strengthening exercises, activities for balance and control, stretching exercises, or a combination of these. Examples of home exercises include walking in the house and to the store as necessary, lifting and carrying groceries, alternating leg lunges, stair climbing, stand-to-sit and sit-to-stand using a chair and from the floor, chair squats, and sit-ups and pushups. In addition, traditional Tai Ji Quan, Qigong exercises, and yoga should be considered since they require no equipment, little space, and can

be practiced at any time. The use of Health and exercise videos, which focuses on encouraging and delivering physical activity through the Internet, mobile technologies, and television are other viable avenues for maintaining physical function and mental health during this critical period.

Given the concerns about the increasing spread of COVID-19, it is imperative that infection control and safety precautions be followed. Home stay is a fundamental safety step that can limit infections from spreading widely. But prolonged home stays can increase behaviors that lead to inactivity and contribute to anxiety and depression, which in turn can lead to a sedentary lifestyle known to result in a range of chronic health conditions. Maintaining regular physical activity and routinely exercising in a safe home environment is an important strategy for healthy living during the coronavirus crisis. Being lonely or socially isolated can negatively affect your wellbeing. There is even research showing that it increases the risk of illnesses such as cardiovascular disease, dementia, and depression. Some researchers suggest that loneliness and social isolation lead to poorer health because they increase inflammation. Inflammation is when your body tells your immune system to produce chemicals to fight off infection or injury. It can also occur when you experience psychological or social stress. Short-term, local inflammation – such as when you accidentally cut your finger – can be helpful, but having slightly elevated long-term inflammation is associated with poor health. Researchers propose that loneliness and social isolation are linked to this elevated long-term inflammation. Our analysis revealed that people who are more socially isolated have higher levels of two inflammatory chemicals: C-reactive protein and fibrinogen. C-reactive protein is commonly used as an indicator of inflammation and high levels are associated with poor health. Fibrinogen increases blood clotting and is higher when people have an injury or trauma. When people have long-term increased levels of these inflammatory markers, it can lead to an increased risk of poorer health over time [8,9].

Immune System, Its Activation and Immunity Development

Immune system protects our body from deleterious substances and germs. There is no other way except immune system to fight deleterious substances that enter our body from outside or harmful changes that occur inside our body. When functioning properly the immune system identifies a variety of threats including viruses, bacteria and parasites and distinguishes them from the body's own healthy tissue. As long as your immune system is running smoothly, you don't notice that it's there. But if it stops working properly because it weak or cannot fight particularly aggressive germs you get ill. Professor Jack Gilbert said that exposure to microbes prevalent in the great outdoors will establish a stronger more boost immune system in young people [10,11]. The immune system can be activated by a lot of different things that the body doesn't recognize as its own. These are called antigens. Examples of antigens include the proteins on the surfaces of bacteria, fungi, and viruses. When these antigens attach to special receptor on the immune cells, a whole series of processes are triggered in the body. Once the body has come into contact with a disease-causing germ for the first time, it usually stores information about the germ and how to fight it. Then, if it comes into contact with germ again it recognizes the germ straight away and can start fighting it faster. The body's own cells have protein on their surface too. But these proteins don't usually trigger the immune system to fight the cells [11,12]. The way to develop specific immunity to a particular disease is to catch that disease or be vaccinated against it. We are also probably exposed to small doses of various pathogens in our daily lives, large enough to develop immunity but too small to overwhelm the immune system and make us ill [11,13].

Immune System Fight Against COVID-19

Firstly, we have to learn about the structure of corona virus. These are RNA single stranded enveloped viruses having crone or spike like outgrowths on their outer surface. Due to these outgrowth structures, these viruses strike on host cell and cause infection in the host. RNA polymerase enzyme replicates viral RNA in cell cytoplasm. The new virions bud off from cell by cell lyses and cause infection. Our immune system kills these infected cells to remove these viruses. It's done by a cytokine storm of adoptive immune system. In neutralization method free viruses are locked outside the cell when antibodies bind to crone like spikes then they cannot enter the new cell for more infection. Hence, innate and humoral adaptive immunity halt severe infection

There are different steps, how does COVID-19 attack. Healthy immune system can cure infection within 2-3 weeks by itself from the beginning of symptoms. It prevents from alveoli infection of lungs. These patients can recover the infection. Second elderly people do not have strong innate and adaptive immune system to combat with infection. Covid-19 infect the alveoli of lungs. Epithelial cells of airway secrete immune molecules such as chemokine and cytokines that act as immune effector cells and play an important role in cell-mediated immunity. Cell mediated immunity starts to kill the infected cells. The increase in local and systemic cytokines will increase acute inflammation of alveoli tissue and harm the lungs by filling with its excaudate. It causes respiratory damage and hypoxia that destroys the kidney and liver. It will also attack on the alveoli of lungs due to decrease in number of memory cells [14]. When any germs like bacteria, fungi and viruses (COVID-19) called antigens, get enter inside our body. Our Bodie's immune system produces antibodies having specific receptor proteins against anti-agents. These will activate our immune system. Our immune system has different organs that work together to kill COVID-19 [15]. If our immune system is weak, we cannot fight against viruses. Then plasma infusions are injected from a person already infected with virus but now cured. His immune system has a lot of antibodies against that virus. Immunoglobulin proteins in our serum also work against germs. Last time it was used to cure the SARS. Germs easily enter into children but still statistics show that children are more resistant to COVID-19 than adults. Because children are less exposed to pollution of the environment. They don't smoke and have healthy lungs than adults [15,16].

There are 3 types of immunity that defend our body from coronavirus. Innate (non-specific) Immunity, external barriers (our skin and mucous membrane of gut and throat). Adaptive (specific) Immunity, when antigens get enter inside our body. Passive (borrowed) Immunity, when we take any medicine like gamma globulin injection or infusions. These subsystems work together to fight against deadly COVID-19. Scientists still not have discovered vaccine against COVID-19. Our immune system is best to fight against COVID-19. Let see how our immune system work against COVID-19 [17].

Social Distancing and Why Socializing Are Good for Health?

Social distancing is basically the physical separation of people. Behavioral alteration has been a part of human retaliation to contagious disease for centuries. Recently the world health organization, governments, and public health experts have highlighted the potential importance of public policies designed to evoke behavioral changes in preparing for and answering to contagious disease epidemics. Public facility shut downs (for instance school closures and mass transit) are forms of social distancing. These policies are made to reduce the ordinary contact among people. So, in days of corona virus social distancing is beneficial [18].

- While doing work, take break for a while and go with people increase the work productivity.

- Highly social people have less chance to catch a cold. The research found that extroverts may have more robust immune system.
- For many of us the last thing we want to do when we are feeling down is to go out and socialize. But study shows that connecting with other people actually helps in improve our mood and fight off depression.
- Active socializing delays memory loss. Strong social ties can preserve our brain health. Social interactions can help keep us mentally engaged. So, keep in touch with friends to keep your brain sharp [18, 19].

Effect of Social Distancing on Immune System

Meanwhile social distancing has bad effect on our immune system. Here we discuss some points which shows that contact with people and to be social is also very important to boost our immune system. Loneliness can make your immune system less vigorous. Actually, loneliness induced stress which activate adrenocortical system which also known as the fight or flight response. Basically, this response is useful in the case of a real threat, and if it continually activated over time it can become harmful. Health experts says that loneliness and self-isolation cause stress which ultimately send your immune system into exploit [20].

Factors That Improve Our Immune System

There are many factors that affect our immune system naturally. Turmeric is an herb. It is very important to fight against HIV and improve our immune system. It also increases the CD4+ count.

Black cumin is also anti-microbial have ability to fight against cold and viral infections. It is effective against allergies and asthma. It reduces allergy up to 90%. It produces immune cells by stimulating bone marrow. It produces interferon and work against viruses. Ginger (Zingiber officinales) has many antiviral compounds like sesequiterpenes that are specific for cold viruses (rhino viruses). Cinnamon improves metabolism and digestion. It controls blood sugar. Ashwagadha (Withania somniferum) belong to pepper family. It is used as tonic, anti-inflammatory, restorative, immune stimulant, adaptogen and rejuvenator. St. Johns wort (Hypericum perforatum) is used to treat depression. It has ability of antiretroviral. It is used for HIV infection. Aloe vera is used against burn skin, bacteria, virus and fungi. It is anti-inflammatory. Eleuthero coccus has ability to increase immune cells like T4 lymphocytes and it decreases the effect of HIV that causes AIDS disease. Schisandra and Eleuthera in combined form boost athlete's immune system.

Liquoirice (Glycyrrhiza glabra) is very effective against common cold and influenza virus. It is very important weapon against SARS (Severe acute respiratory syndrome). Compound present in root of this plant with other four drugs like ribavirin is effective against coronavirus (the virus behind SARS). Ribavirin has side effects like it destroys the red blood cells too. But Liquoirice has no such type of side effects. It only destroys the virus and also destroy its ability to stick with cell wall and penetration. It also reduces fever works like aspirine.

Some other plants are Echinacea purpurea, Bilberry, Licorice root, Spirulina, Agathosma betulina, Tea tree oil, Coenzyme Q-10, Omega-3-Fatty acid, Vitamin C, Vitamin D, zinc and selenium (Effective against new germs especially Ebola virus) [21].

Germs Are Also Important for Us

Some bacteria are very important for humans like Helicobacter pylori is living with human species for two hundred thousand years and it is most successful in human history. Half of the stomachs in this world are occupied by bacteria. These microbes start with our birth. As babies pass through mother's canal these attract the pathogens. As the babies grow their body is blanketed with a hundred trillion or more bacteria,

some viruses and fungi like. These come to us from different things like trees, pets, clothing, cars, buildings, food and furniture. These germs are found in our gut, mouth, skin, teeth space, breathing canal and throat. We have almost ten thousand bacterial species in our body. These are known as our micro biomes play crucial role in our bodies. Almost four million genes of our micro biome are working on our behalf and protect us from infarctions. These germs make and boost our immune system. Also effect on our brain's chemistry and affect our mood and behavior. The destruction of bacteria causes different diseases like asthma, Cohn's disease, obesity and many other illnesses. Plants also need microbes for nitrogen fixation like Rhizobium that live in the roots nodules of leguminous plants fix the Earth's nitrogen for plants. So, it's very important to live with microbes otherwise we will get infected with different diseases [22, 23]. As social and economic factors are changing day by day, increase in population cultural traditions and agriculture are affecting diets worldwide. Our diet and nutritional status have many effects on the composition and vigorous operations of our gut microbial populations [23].

CONCLUSION

This paper concludes that social distancing keeps the host safe but it exerts a negative impact on the host in way of stress, immune system exploitation etc. loneliness induced stress which activates adrenocortical system which also known as the fight or flight response. Although no vaccine is accessible in the market for coronavirus while strengthening the immune system also keeps the virus away from the host. Innate, adaptive and passive immunity has power to kills infected cells. The immune system works best with cytokines (protein cells which are released by the immune system). Germs are also important for us that plays a crucial role in the human body. To improving the immune system, some weapons are turmeric, black cumin, ginger, cinnamon, aloe vera etc. Once the body has come into contact with a disease-causing germ for the first time, it usually stores information about the germ and how to fight it

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Authors Contribution
All authors contributed equally in designing, data collection, assimilation and writing of this manuscript and the final version was read and approved by all authors.

Conflict of Interest
The authors declare no conflict of interest.

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