



Corona Pandemic: a way for improving our immune system

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ABSTRACT

The corona virus spreading from china is now become a pandemic that circles the globe. Last three decades were ringing the alarm bell by emergence and re-emergence of scanty but dangerous outbreak like Zika, MERS and Ebola. Some of these are novel agents which suggested for combating the battle of infectious disease without having drug or vaccine. In the situation like war without weapon one should be ready with strong immune system. This corona period is providing clear and loud message for everyone to care for self. People are required to give room for yoga and balancing the diet in their fast pace life. Present article is describing the brief, but essential information for having strong immune system.

Keywords: COVID-19, Immunity boosters, Natural resistance, Corona pandemic

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INTRODUCTION

Corona virus disease (COVID-19) is an infectious disease that started in Wuhan province of China in December 2019. The degree of infectivity of this virus can be estimated that within three months all most all countries of the world are in grip of this disease and declared as global pandemic by World Health Organisation (WHO). COVID-19 pandemic is now global health crisis of present time and one of the greatest threats we have faced after World War II. This pandemic is a lot more than health crisis. It is causing stress to everybody and creating devastation to social, economic and political condition to every country that is definitely going to leave big scars in our memories.

It is not right to say that this pandemic has appeared to us suddenly. From last decade nature was giving us enough alarms for preparedness, by scanty but lethal outbreaks such as SARS, MERS, Ebola, Zika which are also mediated by virus. Highly mutagenic nature of virus makes difficult task for our scientist to discover medicine. Since, virus used host machinery for their survival and antiviral drugs also causes side effect to host which may lead other complications. Vaccine preparation is another good strategy, but it is long journey from the identification of target to reach the market. Here I would like to mention that preparedness should not be all the time expected from government, medical staff and scientist, as an individual it is everyone's responsibility to ready with personal preparedness with the motto 'CARE FOR SELF'. It will not only protect us, but also help in reducing impact of disaster on our health care machineries, societal and economic aspect of our country.

In today's fast paced live where everybody is involved in meeting deadlines, combating stress of various kinds at work place or home and wasting rest of the time in social media, nobody is taking care for self. In this unprecedented time we should take pledge to 'CARE FOR SELF'. If each individual started taking care for self there will be significant reduction in mortality and morbidity rate in general and due to any outbreak as well.

IMMUNE SYSTEM A NATURAL RESISTANCE

For taking care for self, first step is to always keep immune system in good state. In our daily life by concentrating on certain facts we can improve the state of our immune system. If we are getting frequent infection especially cold and cough, gastric infection, problem in wound healing and feeling lethargic most

of the time may have indication towards weak immune system. One can also check their complete blood count annually to find out the level of protein (immunoglobulins) and blood cells fighting against the infection and play major role in strengthening immune system.

Immune system is our body's defence system comprise of non specific and specific wings. Non specific wings comprise of anatomical barrier like skin, gastrointestinal tract, the respiratory tract, the nasopharynx, cilia, eyelashes and other body hair. Some cells like macrophages, phagocytes, neutrophils, natural killer (NK) cells, dendritic cells are the first one who come to site of infection and mount an immune response in non specific manner. Lymphocytes cells like B and T cells are main member of specific or acquired immunity. B cells produce or secrete antibodies that specifically recognizes the disease causing organism and help in deleting from our body. There are variety of T lymphocytes inside our body, some of them help to B cells and few directly attack infectious agents and either eliminate bacteria or viruses directly or destroy infected host cells. Weakening of any arm of immune system lead to compromised stage where person become more prone to infection and gives opportunity to pathogen to establish them and cause disease. Since immune system act as army, it is very pertaining to keep your immune system strong and boosting our immune system may protect us against any kind of infection.

Sedentary lifestyle, food habit, poor nutrition status, smoking, drinking alcohol and stress of work or society are among in many of the contributory factors which weakened the immune system. By doing little efforts every day we can enhance the immune system and can become bad host for any kind of infectious disease. There are varieties of ways by which we can enhance our immune system. Our first line of defence should be healthy life style for which we should rely on disciplined life. We can start from our diet regulation and should include healthy and leafy vegetables, avoiding junk food. Smoking and drinking should also be avoided. Yoga, meditation and exercise should be included in our routine activity. According to WHO guidelines every individual should perform yoga/ exercise at least five days in a week for minimum of 30 minutes that can be brisk walking, running, meditation etc. In modern society imbalanced diet is one of major factor for weakening of immune response lead to development of ailments like diabetes, hypertension etc. Imbalanced diet may cause deficiency of many macro and micronutrient and vitamins which ultimately caused weakening of our immune system and which leave person susceptible for recurrent infection. Adequate sleep is also one of the important factors for proper functioning of our immune system.

IMMUNITY BOOSTERS

Vitamins are the booster for immune system and really can help to fight against any kind of infection, especially viral infection. It is known for long, these are an essential constituent of our diet and can greatly influence our immune system. Vitamins are organic compounds and needed in trace amounts in our diet because they cannot be synthesized in sufficient quantities by our metabolic pathways [20]. Among all the vitamins known so far some vitamins act in a very specific manner to affect immune system while few act as antioxidant and support our strength to fight against diseases. Level of vitamins in our body can easily be estimated in blood and can give idea about deficiency level if any.

Vitamin D which is known to be involved in the maintenance of bone mineral homeostasis has also been found to execute various pleiotropic effects by directly affecting the immune status of individual by regulating both arms of immunity whether specific or non specific. This vitamin is either synthesized in the skin using sunlight or it can be obtained by our diet. Calcitriol (the active form of vitamin D) stimulates the expression of some antimicrobial peptides in epithelial cells, such as those lining the respiratory tract, protecting the lungs from infection. There was good correlation was reported between vitamin D deficiency and infectious disease of upper respiratory tract. Some clinical studies have demonstrated promising effects of vitamin D supplementation on several infection outcomes including tuberculosis, upper respiratory tract infection, hepatitis C virus, and HIV [15, 26]. Further, supplementation with vitamin D reduced the morbidity and mortality rate caused by few infections [25]. Vitamin D deficiency is also known to cause autoimmune diseases a condition where our own cells are attacked by antibodies and weaken the immune system and leave the person more susceptible for any kind of infection [17]. In fact, hypovitaminosis of D is a common finding in several autoimmune diseases.

Since sunlight is well known source of vitamin D it is also known as sunshine vitamin. Many of us spend most of the time under roof due to job related requirements and did not get chance of exposure to sun, but there are many other food sources which can help us to restore the level of vitamin D. Cow or soy milk, mushroom, cod liver oil and eggs are among the sources which have good level of vitamin D and can replenish the vitamin D deficiency.

Vitamin D is one of most common deficiency in India. In community based report, prevalence of vitamin D deficiencies was found to be around 50% to 94%, while in hospital based studies it varies around 37% to

99% [2]. Further direct correlation with vitamin D deficiency and infection makes this situation more alarming. Testing serum vitamin D will help us to know the status and accordingly we can take measures. Taking all report together, vitamin D comes as a promising safe nutrient for new strategies for the prophylactic and adjunctive treatment of diseases caused by compromised immune system.

Vitamin A can be obtained as preform of vitamin A from foods such as liver, cod-liver oil, butter, eggs, and dairy products and as provitamin A carotenoid, in foods such as spinach, carrots, and orange fruits and vegetables. Among the micronutrients, vitamin A plays a central role in normal immune function. From the very beginning, it was perceived that vitamin A is good for the health of eyes, but now it is well known that disturbances in immune function, anaemia, and increased infectious disease morbidity and mortality occur during vitamin A deficiency [21].

Our skin act as first barrier for entry of pathogen and vitamin A is very important element which maintain the integrity of skin and mucosal cells. Vitamin A is also one of the essential molecule in regulating function of cells fighting against infection *i.e.* lymphocyte proliferation and their migration towards the site of infection and they have a role to play in antibody secretion and immunity related to gut. Vitamin A is also required for the normal functioning of several immune cells *i.e.* NK cells, macrophages cells, T and B lymphocytes. These cells are main warriors of our immune system fighting against viral infection [16, 22].

A sure sign of vitamin A deficiency is decreased antibody responses against infectious antigens that can be virus, bacteria or parasites [19]. In children with Acquired Immune Deficiency Syndrome (AIDS), high-dose vitamin A supplementation increases circulating lymphocytes and NK cells. Further Vitamin A appears to play a key role in lymphopoiesis, which may explain the increases in total lymphocyte counts, NK cells associated with vitamin A supplementation or improvement of vitamin A status. [13].

Vitamin A deficiency was found to be highest in India among South Asian countries. Among preschool children 62% were found to be deficient in vitamin A. Women of reproductive age are also shown to severe deficiency of vitamin A [1]. Deficiency of vitamin A can be restored by including variety of vegetable or fruits in our lunch and dinner like spinach, sweet potato, carrot, pumpkin and tomato. Papaya, mango, watermelon, milk are also good source of vitamin A.

Vitamin A has both enhancing and regulatory effect on our specific and non-specific immune system therefore, maintaining the required level; we can strengthen our immune function and can become quite resistance against various kinds of infectious diseases. Vitamin A supplementation has proved to be beneficial but it is clearly indicated that supplementation above the normal level may have negative health consequences.

Vitamin C contributes to immune defence by supporting various cellular functions of both the specific and non-specific wings of the immune system. Vitamin C play major role in proliferation and function of neutrophil, monocytes and phagocytes which are the major cells for microbial killing. Along with enhancing cellular function vitamin C are also known to increase the antibody level against pathogens. Vitamin C supports epithelial barrier function against pathogens and promotes the oxidant scavenging activity of the skin, thereby potentially protecting against environmental oxidative stress [4]. Vitamin C is also able to protect from infection and shown that supplementation has beneficial effect on cure from infection. Person who are having frequent cold cough are tend to have lower Vitamin C level and supplementation with this reduces the recovery time.

Reports are also suggesting that vitamin C deficiency may lead to impairment in our immune system and deficient individuals may be highly prone to potentially fatal infections such as pneumonia [11]. As far as scenario of our country is concern in one of the population based survey, 73% population in north and around 45% south Indian population are having vitamin C deficiency. Patients with scurvy, a disease of severe deficiency of vitamin C also showed presence of multiple infection of respiratory tract [5]. Taking adequate supplementation of vitamin C through the diet or via medicine, especially in groups such as the elderly or in individuals exposed to risk factors for vitamin C insufficiency, is required for proper immune function and resistance to infections [18]. While in study indicate that one-third of adolescent girls had either deficient or sub-optimal levels of plasma vitamin C from the slum area of Delhi [3]. In our country there is paucity of data about prevalence of vitamin C deficiency and it is one of the areas where work can be done to have clearer picture. Orange, kiwi, strawberries, broccoli, cauliflower, tomatoes, potato, papaya, lemon, lychees are rich source of vitamin C and one can replenish the deficiency by including these items in their regular diet.

Vitamin E, a potent lipid-soluble antioxidant, reported to be in higher concentration in immune cells compared to other cells in blood. It is the factors which play role as an antioxidant and protect our cell membrane damage by suppressing free radicals [4, 16].

Vitamin E is known to enhance the NK cell activity [9] and protect macrophage membrane against oxidative damage [8] of immune system. Vitamin E deficiency reduces both antibody production and

particularly that of T cells immune functions [10]. Vitamin E is also regulating T lymphocyte proliferation by maintaining the level of IL-2 which is main cytokine responsible for T cell proliferation. Animal and human studies has shown that the immune function is associated of vitamin E with reducing risk for infectious diseases such as respiratory infections, as well as some allergic diseases such as asthma. Vitamin E shown to reduce the risk of pneumonia and well as common cold in older population [12]. It has been found to be very effective in improving immune impairment connected with age. Supplementation of vitamin E has been shown to be beneficial in mitigating several viral, bacteria and allergic diseases such as asthma.

There is very scanty data available for the prevalence of Vitamin E malnutrition in India. In one of the study children suffering from protein-energy malnutrition showed significantly reduced serum Vitamin E levels compared to age-matched normal children [14]. In another observational report among school going children around 31% were having vitamin E deficiency [6]. Since there is scanty data regarding vitamin E deficiency in our country it is requirement of the hour to generate the data base of population of various strata and age. Sunflower seeds and oil, peanuts, almonds, avocado, spinach, pumpkin are some of the sources having vitamin E in good quantity and can be use to remove deficiency, but at the same time higher quantity may cause some adverse effect to our system.

Vitamin B is group comprised of 8 vitamins. Among vitamin B complex, B6 is well known contributory for enhancing the NK cell activity [16]. Vitamin B12 is known to enhance cellular immunity by up regulating the activity of cytotoxic T cells and NK cells [9]. In patients with vitamin B12 deficiency, decreased CD8⁺ cells levels were observed, with high CD4/CD8 ratio and suppressed NK cell activity [24]. Vitamin B6 and B12 are also contributed in antibody synthesis and together work for the synthesis of red blood cells and immune cells. In one of the study 47% Indian were shown to have vitamin B12 deficiency [23]. In an observational study with small cohort total 53% participant were having B vitamin deficiency [7]. Chicken, green vegetable and chickpeas are the few known sources of vitamin B6. Food sources of vitamin B12 are animal products that include meat, fish, poultry and dairy products. It is generally not found in plant food that makes vegetarians at more risk of having deficiency.

Vitamin K is least studied vitamin. It play important role in blood coagulation and known to regulate inflammation which is one of the important aspect of immune response. Vitamin K deficiency caused serious issues related to blood clotting. Spinach, broccoli, kiwi, green peas are good source of vitamin K. It is also found in animal food. To the best knowledge there is no data regarding its deficiency.

It is firmly known that nutritional imbalance greatly affects the functioning of the immune system. In addition, it is increasingly recommended that nutrient intake, may beneficially affect immune function, and modulate chronic as well as acute response to infectious diseases. But at the same time, it is good to maintain the level of every nutritional component. Irrational intake may affect health and create other kind of health issues lead to development of co morbidities. Balanced nutritional intake and that too in disciplined not only make strong immune system but also prevent from developing other kind of life style related disorder like obesity, diabetes, acidity and cardiovascular diseases. Also, prevention from developing co morbidities, definitely going to help us to fight better against emerging and re-emerging infections, like corona virus. Having strong immune system will further work as icing on the cake and keeps fit the person.

CONCLUSION

Keeping optimum levels of vitamins and other nutrient one can keep immune system strong. The less efficient your immune system is the more prone you are to infection and inflammation. Keep boosting our immune system not only increasing the longevity but also increase the quality of life. The positive aspect of the maintaining healthy and balanced life that one can boost immune system and better the immune system we are able to cope with health relates issues or infections of daily life irrespective of our age.

For any kind of emerging and re-emerging infections until the vaccine or drug available one should have to rely on their immune status. The coronavirus pandemic has fetched the world's attention to the immune system. It is high time to learn the lesson from this pandemic to keep our selves fit. By doing this we can keep our Nation fit.

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