WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 9, Issue 8, 2434-2453. Review Article ISSN 2277– 7105

A REVIEW ON MICRONUTRIENTS AND THEIR IMPACT ON IMMUNE SYSTEM

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Article Received on
20 June 2020,

Revised on 10 July 2020,
Accepted on 31 July 2020,

DOI: 10.20959/wjpr20208-18331

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ABSTRACT

Micronutrients assume a significant job to help the invulnerable arrangement of the body. It has been built up that the perplexing, incorporated insusceptible framework needs numerous particular micronutrients including nutrients A, D, C, E, B6 and B12, folate, zinc, iron, copper, selenium, assume an essential job in invulnerable reaction. Micronutrients with the most grounded proof for resistant help are nutrient C, D and zinc. As human age, the hazard and seriousness of contaminations differ in accordance with insusceptible capability as indicated by how the resistant framework creates, develops, and decays. Micronutrients insufficiencies are a perceived worldwide general medical problem and poor nourishing status inclines to specific contaminations. Insusceptible capacities might be improved by reestablishing insufficient micronutrients. Micronutrients, for example, zinc, selenium, iron, copper, nutrient A, C, E, folic corrosive can impact a few segments of insusceptibility. The quickly spreading crown infection sickness is negatively affecting safe traded off people. Covid 19 is still extremely new as there is no clinical advancement with respect to treatment. In spite of the infection fast pace of transmission, counteraction and recuperation are conceivable given a solid invulnerable framework. A working invulnerable framework ought to have the option to recognize and battle illness causing pathogens like microorganisms and infection.

KEYWORDS: micronutrients, immune system, vitamins, minerals, age related immunity, deficiency, immune boosting foods and vitamins - covid 19.

INTRODUCTION: WHAT ARE MICRONUTRIENTS?

Micronutrients are basic components required by living beings in changing amounts all through life to arrange a scope of physiological capacities to keep up health. Micronutrient prerequisites contrast between life forms; for instance, people and different creatures require various nutrients and dietary minerals, though plants require explicit minerals. For human nourishment, micronutrient necessities are in sums commonly under 100 milligrams for each day, while macronutrients are required in gram amounts every day. They incorporate nutrients and minerals. Nutrients are fundamental for vitality creation, insusceptible capacity, blood thickening and different capacities. In the meantime, minerals assume a significant job in development, bone wellbeing, liquid parity and a few different procedures.

MICRONUTRIENTS HAVE MAJOR IMPACT ON IMMUNE SYSTEM BOOSTING IMPORTANCE OF MICRONUTRIENTS

Almost 30 nutrients and minerals that your body can't fabricate in adequate sums all alone are designated "fundamental micronutrients." British mariners learned hundreds of years back that living for a considerable length of time without new natural products or vegetables—the principle wellsprings of nutrient C—caused the draining gums and drowsiness of scurvy, an infection that frequently demonstrated lethal. Indeed, even today in some low-pay nations, individuals habitually experience the ill effects of an assortment of supplement inadequacy sicknesses.

Genuine nutrient and mineral insufficiencies—in which the absence of a solitary supplement drives straightforwardly to a particular affliction—are uncommon in the United States in light of the fact that our broad gracefully of reasonable food, and the stronghold of numerous regular nourishments with some key supplements. Be that as it may, eating not exactly ideal measures of significant nutrients, minerals, and different mixes can in any case add to various significant ailments, for example, coronary illness, type 2 diabetes, malignant growth, and osteoporosis. Subsequently, worry about "deficiency"— a disputable subject—is a significant driver of both the U.S. dietary rules and the mass showcasing of over-the-counter enhancements.

MICRONUTRIENTS TO BOOST YOUR IMMUNITY.

Micronutrients	Food sources
Vitamin B6	Chicken, cereals,banana,potatoes with skin
Vitamin C	Tomatoes, citrus fruits, kiwi fruit, broccoli.
Vitamin E	Sunflower seeds, oil, almonds
Magnesium	Whole wheat, legumes, nuts
Zinc	Oysters, beef shank

To keep up your cerebrum, muscle, bone, nerves, skin, blood flow, and resistant framework, your body requires a consistent gracefully of various crude materials—both macronutrients and micronutrients. You need a lot of macronutrients—proteins, fats, and starches. And keeping in mind that you just need few micronutrients—nutrients and minerals—neglecting to get even those little amounts essentially ensures illness.

MICRONUTRIENTS AND ITS FACTS IN BOOSTING IMMUNE SYSTEM AGAINST COVID 19: Micronutrients, regularly alluded to as nutrients and minerals, are imperative to sound turn of events, ailment avoidance, and prosperity. Albeit just required in limited quantities, micronutrients are not created in the body and should be gotten from the diet1. Micronutrient lacks can have annihilating results. At any rate half of youngsters overall more youthful than 5 years old experience the ill effects of nutrient and mineral deficiencies2. The job of six fundamental supplements is illustrated beneath.

IRON

Iron is basic for engine and psychological turn of events. Kids and pregnant ladies are particularly powerless against the results of iron deficiency3. Iron could be a main source of frailty which is characterized as low haemoglobin focus. Paleness influences 43% of children younger than 5 years old and 38% of pregnant ladies globally3.

Iron deficiency during pregnancy expands the danger of death for the mother and low birth weight for the new-born child. Round the world, maternal and neonatal passing's all out between 2.5 million and three.4 million each year3.

The World Health Organization (WHO) suggests iron and folic corrosive enhancements for diminishing weakness and improving iron status among ladies of regenerative age4. Sustaining flour with iron and folic corrosive is all around perceived as a viable, minimal effort intervention.

VITAMIN C

VITAMIN C is one amongst the foremost generally known insusceptible boosting micronutrients. As an incredible cancer prevention agent, ascorbic acid has antibacterial and mitigating impacts against pathogens. It additionally animates the creation of antibodies and white platelets that forestall illness.

VITAMIN D

VITAMIN D fabricates the healthy bones. Fat-soluble vitamin lack causes bone ailments, remembering rickets for children and osteomalacia in adults. Vitamins and micronutrients are required for muscle and nerve functions. Vitamin D enables the invulnerable framework to oppose microscopic organisms and viruses. Besides supporting calcium assimilation and bone turn of events, D likewise upgrades resistance by managing the body's antimicrobial reaction. Vitamin D additionally enacts the body's provocative reaction to contamination, along these lines diminishing the danger of system illnesses like various sclerosis, rheumatoid joint inflammation and incendiary gut ailment. Within the interim, harmed safe cells have likewise been looked as if it would respond emphatically to high groupings of fat-soluble vitamin. Regular food wellsprings of vitamin D incorporate mushrooms, eggs, crude milk, salmon, fish, mackerel, sardines and whole grain oats.

FOLATE

The vitamin B complex vitamin referred to as folate aids various body functions including immunity, metabolism and DNA synthesis. Specifically, folate facilitates cell growth and development. Therefore, it may also accelerate wound healing and stimulate tissue repair. Folate is additionally known to extend the assembly of antibodies that identify disease-causing pathogen.

ZINC

Zinc has ground-breaking antiviral and calming properties which will lessen the hazard and length of tract contaminations like regular colds, influenza and pneumonia. High convergences of zinc have additionally been looked as if it would improve normal executioner cell action. Superb wellsprings of zinc incorporate pork, hamburger, chicken, beans, nuts, natural cheddar, crude milk and plain yogurt.

A solid resistant framework can decrease the danger of contracting diseases like colds, influenza and COVID-19. Improve invulnerability by expanding the admission of fundamental nutrients and minerals that guide safe capacities. Moreover, receiving a solid way of life that features customary exercise and appropriate sustenance can fundamentally help the insusceptible framework.

Zinc advances insusceptible capacities and assists individuals with opposing irresistible ailments including the runs, pneumonia and malaria14. Zinc is likewise required for solid pregnancies. All around, 17.3% of the populace is in peril for zinc insufficiency due to dietary deficiency; up to 30% of people are in peril in certain areas of the planet. Giving zinc supplements diminishes the occurrence of untimely birth, diminishes youth loose bowels and respiratory diseases, brings down the number of passings from all causes, and expands development and weight gain among babies and tiny youngsters.

MICRONUTRIENTS AND IMMUNESYSTEM

ANTIOXIDANT VITAMINS

vitamin E is the fat soluble vitamin which protect lipids – which are the building blocks of cell membranes – against attack by free radicals (e.g., highly reactive oxygen compounds). These free radicals occur in the body as a result of metabolic processes like immunological reactions and the effect of environmental influx- fences. Experimental findings indicate that vitamin E also can stimulate the system directly (1): the vitamin acts totally on the mast cells (mastocytes), which belong to the leukocyte (white blood cell) group.

(2) and play a special role in wound healing, in warding off pathogens and in allergies.

Mast cells are active- voted by oxidized lipoproteins that occur under the influence of pro-inflammatory signalling molecules (cyto- kines). These cells then release signalling molecules which in particular encourage allergic inflammatory pro- cesses. Vitamin E is assumed to influence these processes on several levels. In the first place, because of its antioxidant properties vitamin E can limit the oxidation of lipoproteins and hence

prevent the excessive pro- duction and activation of mast cells. In this way the vitamin can combat overreactions of the system and allergies. Moreover, vitamin E reduces the formation of pro-inflammatory cytokines that are produced by macrophages (scavenger cells) and their precursor cells (monocytes).

(3). Additionally, vitamin E appears to act directly on T cells (white helper cells) and is therefore ready to reduce inflammation.

(4). The antioxidant vitamin C can also support the immune system and reduce the severity of allergic reactions.

(5). Its mode of action on the immune system has been only partially researched. As a water-soluble anti- oxidant it can prevent oxidative damage inside immune cells caused by reactive oxygen species which are released in greater quantities on activation of the immune reaction. Vitamin C also appears to act directly on the cellular (immune cell) and hum- oral (plasma proteins like antibodies) components of the system (7). Hence the vitamin can promote activity by the white blood cells (leukocytes, lymphocytes, T cells) and macrophages, prolonging their function, and can stimulate the release of the signalling molecule interferon, which is involved in the defence against viruses. Vitamin C also accelerates the decomposition of histamine in the blood. As a signal- ling molecule, histamine is substantially involved in the development of cold symptoms in terms of inflame- amatory reactions. Although targeted consumption of vitamin C does not, in general, appear to afford protection against colds, some studies do indicate that the vitamin can reduce the duration and severity of infections of the upper respiratory tract.

(8). especially, people that do hard physical beat short periods of your time and/or are exposed to low temperatures for lengthy periods could combat colds with regular consumption of vitamin C. Taking 200 mg of vitamin C per day could alleviate the symptoms of acute respi- rotary infections in the elderly. The effect of beta-carotene on the immune system is based essentially on its properties as a fat-soluble antioxidant. Reactive oxygen species are formed extensively during inflammatory processes intended to render germs harmless. Beta-carotene, working together with other antioxidants, can ensure balanced regulation of oxidative processes, so that infectious germs can be fought without allowing an excess of free radicals to damage the immune cells.

The undertaking of the safe framework is to make sure the creature against unsafe outside impacts, e.g., microorganisms. One results of a secure response is aggravation,

which serves to evacuate remote bodies or obsessively modified cells. In any case, if the insusceptible response isn't suitable it'd prompt unwanted impacts, including expanded defencelessness' to contaminations if safe capacity is lessened, or sensitivities, system maladies and ceaseless irritation on account of hyper function. To satisfy its numerous and different defensive and flagging capacities, the resistant framework depends on the satisfactory accessibility of micronutrients. Potential inadequacies can influence both vague (natural) and explicit (obtained) invulnerability.

An individual's psychological state, even as their state of being, enormously impacts safe framework movement. Interminable (provocative) sicknesses or continuous physical effort (work or sports) can prompt for all time raised resistant framework movement and increase the need for micronutrients. Nutrients, minor components and omega-3 unsaturated fats, specifically, are vital for the mixture of parts of the resistant guard framework (counting immunoglobulins, cytokines and chemicals). Due to their cancer prevention agent also as calming properties they guarantee ideal usefulness or control resistant cell forms. The supplements team and supplement one another within the differing ace cesses of the insusceptible framework.

(10). How beta-carotene and other carotenoids could directly string- then cellular and humeral immune defence is so far unclear and requires further research.
(11). One ran- domized controlled study with post-menopausal women was ready to show that daily consumption of a combi- nation of beta-carotene, lutein and lycopene or just one of those carotenoids was ready to protect lympho- cytes against damage to their genetic substance (DNA).

OMEGA 3 FATTY ACIDS

The quality of the resistant framework is additionally subject to an adequate flexibly of the omega-3 unsaturated fats eico-sapentaenoic corrosive (EPA) and docosahexaenoic corrosive (DHA), which assume a basic job within the guideline of irritation (38). While omega-3 unsaturated fats structure the elemental substances for the creation of hostile to inflamma-conservative, hormone - like eicosanoids, omega-6 unsaturated fats (basically arachidonic corrosive) are utilized for the mixture of star incendiary eicosanoids. Within the event that the body is given adequate measures of eicopentaenoic corrosive, the convergence of arachidonic corrosive lessens and with it the measure of star provocative eicosanoids (39, 40). As an outcome the event of expert fiery cytokines is

decreased, almost like the creation of receptive oxygen mixes, high convergences of which may harm insusceptible cells. Genius fiery cytokines, which incorporate interferon's, interleukin-1 (IL-1) and tumour putrefaction factor (TNF), are significant segments of the invulnerable barrier framework. Nonetheless, when present in high focuses they will offer ascent to unreasonable, neurotic incendiary responses. Randomized controlled investigations have indicated that patients with rheumatoid joint pain profit by focused utilization of omega-3 unsaturated fats in animal oil. Growing went down, torment was lessened and morning solidness diminished, and that they required less medicine (non-steroidal enemy of inflammatory).

TRACE ELEMENTS

The effect of iron on the system depends especially on its concentration within the blood. Iron deficit- envy has been linked to many reversible functional disorders of the system, for instance pro- inflammatory processes. In one intervention study with anaemic children, fewer infections were observed after targeted administration of iron. On the opposite hand, the system attempts to deny microbes the iron they have to survive as how of fighting the germs. In any case, sustained consumption of huge doses of iron should be avoided. Zinc impacts invulnerable protection in several manners. As a cancer prevention agent it ensures resistant cells against oxidative harm from responsive oxygen mixes. It satisfies this capacity especially reliably together with nutrient C. Likewise, zinc advances the event, development and movement of varied resistant cells, for instance, the B and T lymphocytes and normal executioner cells, and capacities as a flagging particle for cover cells. A significant absence of zinc can greatly diminish the

action of insusceptible cells and therefore the production of antibodies. In any case, even a small zinc shortfall can make skilled individuals, specifically, progressively defenceless to infection contaminations and hypersensitive ailments. A couple of investigations have demonstrated that adjusting zinc shortages by focused organization can review this powerlessness and fortify the invulnerable framework. Another examination furnished proof that food supplementation with zinc can lessen the speed of intense diseases of the lower aviation routes in kids by 15%. One meta-investigation received the resolution that zinc can diminish the side effects, seriousness and term of a chilly on the off chance that it's taken orally inside 24 hours of the presence of the first indications.

Selenium acts on the one hand as an antioxidant to guard against the reactive oxygen molecules which are formed during immunological processes and, in high concentrations, can cause oxidative damage to the immune cells. On the opposite hand, selenium plays a crucial role within the regulation of the system and of inflammatory processes. Especially as a component of the selenoproteins it regulates signal transmission and therefore the function of immune cells, e.g., the activation of natural killer cells and therefore the formation of signalling molecules (cytokines). Selenium deficiency can contribute to a rise in susceptibility to bac- terial infections or viral infections like influenza and to an elevated risk of complications from infections.

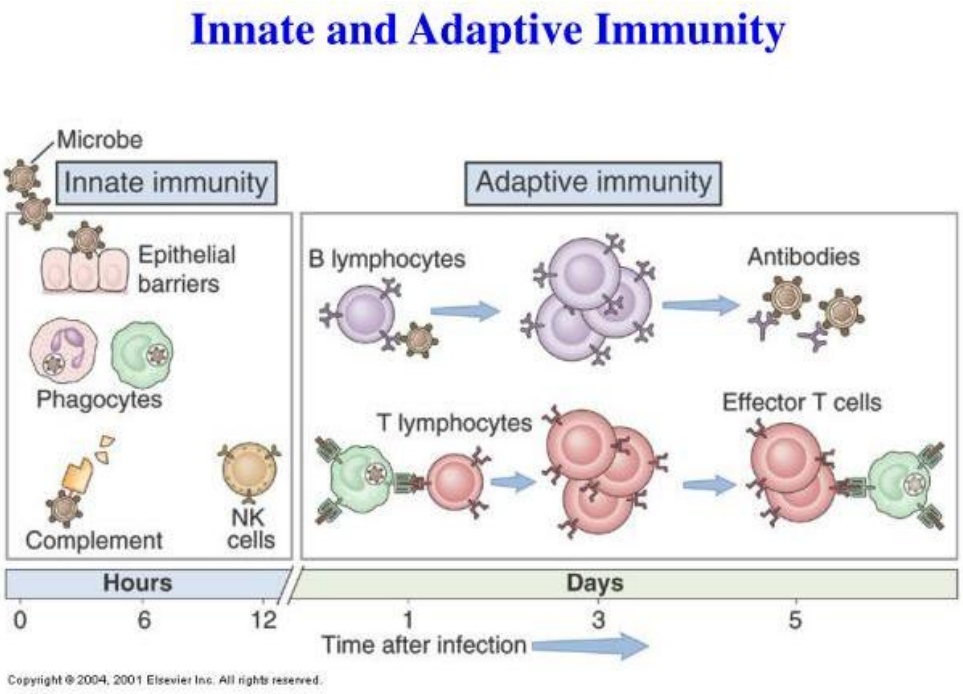
INNATE IMMUNITY VERSUS ADAPTIVE IMMUNITY

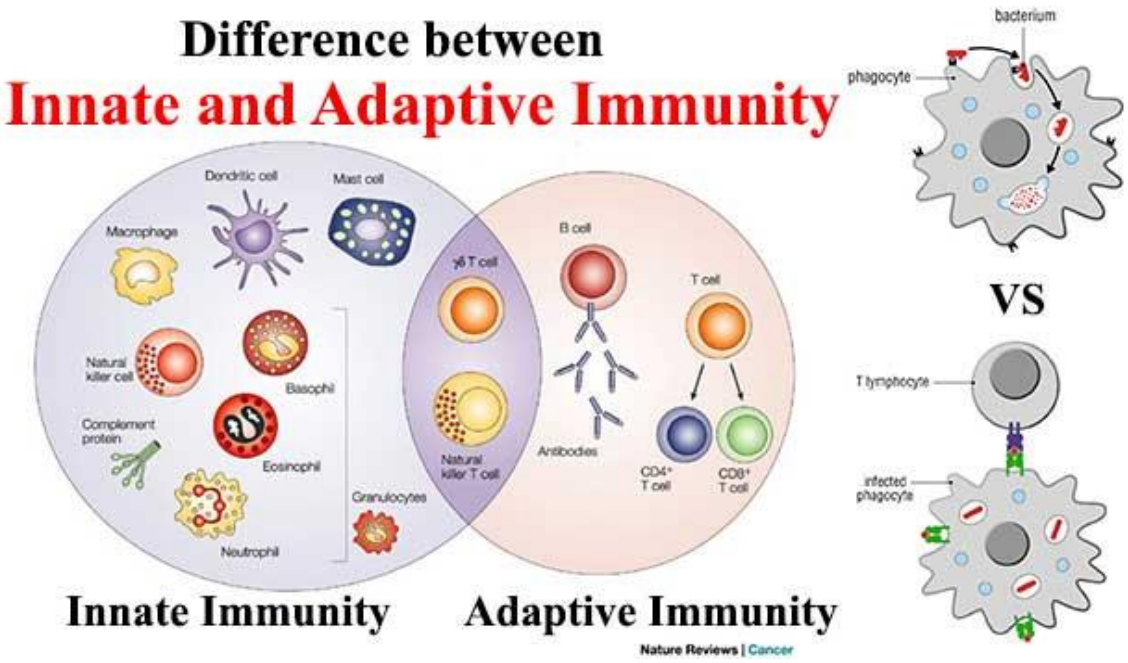
The first line of defence against non-self-pathogens is that the innate, or non-specific, immune reaction. The innate immune reaction consists of physical, chemical and cellular defences against pathogens. The most purpose of the innate immune reaction is to right away prevent the spread and movement of foreign pathogens throughout the body.

The second line of defence against non-self-pathogens is named adaptive immune reaction. Adaptive immunity is additionally mentioned as immunity or specific immunity and is merely found in vertebrates. The adaptive immune reaction is restricted to the pathogen presented. The adaptive immune reaction is supposed to attack non-self-pathogens but can sometimes make errors and attack itself. The autoimmune diseases can develop rheumatoid arthritis.

The hallmark of the adaptive system is clonal expansion of lymphocytes. Clonal expansion is that the rapid increase of T and B lymphocytes from one or a couple of cells to millions. Each clone that originates from the first T or B cell has an equivalent antigen receptor because the original and fights an equivalent pathogen.

While the innate immune reaction is immediate, the adaptive immune reaction isn't. However, the effect of the adaptive immune reaction is long-lasting, highly specific, and is sustained long-term by heart T cells.





	Line of defence	Timeline	Cells	Antigen dependency	Examples
Innate (nonspecific)	First line of defence	Immediate response 0-96 hours	Natural killer cells, macrophages,	independent	Skin hair cough
Adaptive (specific)	Second line of defence	Long-term More than 96 hours	T and B lymphocytes	Dependent	whealswelling, redness.

IMMUNE SYSTEM VS COVID 19

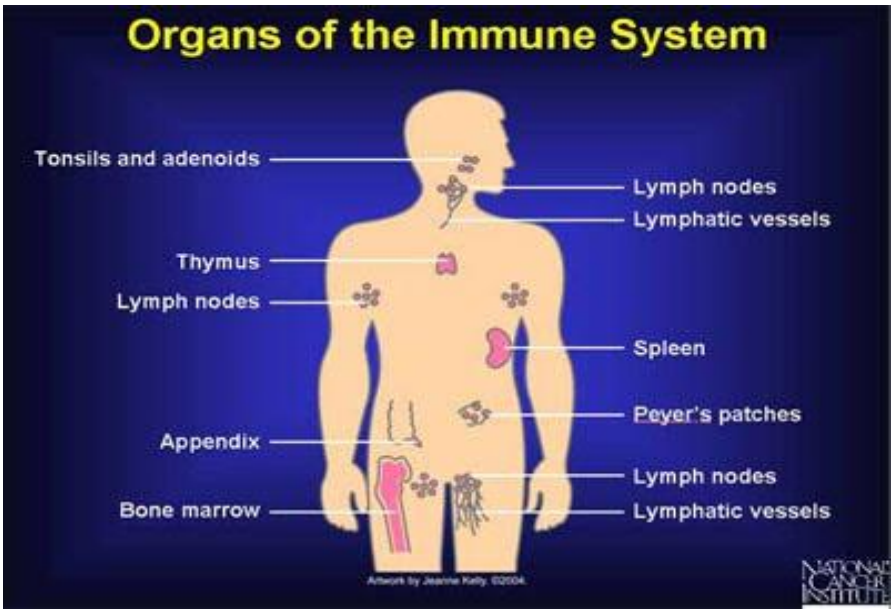
The immune system protects us from viruses and diseases. It produces an antibody to kill pathogen. This review shows a quick picture about the system to guard us from COVID-19. It illustrates the method of the system, how it works, and mechanism of the system to fight virus. It also provides information on recent COVID-19 treatment and experimental data. Various sorts of potential challenges also are discussed for the immunes system. At the top, some foods are suggested and a few are discouraged. Workout is additionally encouraged. This text are often used as a state of the art at this critical moment to the world for a promising alternative solutions associated with the survival of individuals from coronavirus. The earth is relaxing but human is dying. As of 18th April 2020, quite 154,000 people died, 2.2 million are affected, and a minimum of 185 countries are suffering from corona virus. The planet experienced coronavirus for the primary time in 2002-2003 by Severe Acute Respiratory Syndrome (SARS) and in 2011 by Middle East Respiratory Syndrome (MERS). The causative agents for both cases (SARS-Cove and MERS-CoV, respectively) were newly identified coronavirus with zoonotic origin within the Beta coronavirus. This corona virus (SARS-CoV-2) COVID-19 appeared for the primary time in Wuhan, China, at the top of 2019. People are being suffering from human to human transmission thanks to close contact and other people suffering from COVID-19 suffer from severe respiratory disease. People that are elderly and have numerous comorbidities are the foremost susceptible to this virus.

Although there's no registered treatment or vaccine for this disease except for the treatment of affected people, limited urgent use of chloroquine and hydroxychloroquine are approved by the US Food and Drug Administration (FDA). The utilization of an anti-viral drug called Favilavir as a treatment for coronavirus has been approved by The National Medical Products Administration of China. The drug has shown efficacy in treating the disease with very low side effects during a clinical test involving 70 patients. The clinical test goes on in Shenzhen, Guangdong. This review reported the recent observations to develop immunity level in

physical body for resisting the corona virus as an alternate solution before the invention of any drugs and vaccinations.

IMMUNE SYSTEM IN OUR BODY

Our whole body consists of the organs of the system & to guard against diseases. It plays a key role to take care of health and pathogenesis. It also protects our body from harmful substances, germs and cell changes (neoplasm) the key player within the system is that the white blood cells (WBC) which can travel throughout the body using the blood vessels. To watch for invading microbes, our body exchanges cells and fluids between blood and lymphatic vessels and enables the systemlymphatic. The lymphatic vessels carry lymph. Each lymph gland contains specialized compartments where they will encounter antigens. Through the incoming lymphatic vessels, the immune cells and foreign particles enter the lymph nodes. Once they are within the bloodstream, they're transported to tissues throughout the body. They continue the cycle everywhere through patrolling for foreign antigens everywhere then gradually drift back to the systema lymphaticum. The immune cells gather, work, and serve to confront antigens in lymph nodes and spleen's compartments.



IMPACT OF COVID 19 ON IMMUNESYSTEM

COVID-19 is an RNA virus with a crown like appearance. Its diameter is approximately 60-140 nm. On one side, it's a concave surface with a ridge. It makes a bigger binding interface ad well as more contacts with ACE2. It can make better contact with the N-terminal helix of ACE2 and have higher affinity it's transmitted through respiratory droplets from coughing

and sneezing. It enters our nasal system by inhaling and starts replicating. ACE2 is that the main receptor for the COVID-19 virus. The spike protein present on the surface of COVID-19 gets pinched inside the host cell binding to the ACE2 receptor. Here, the enzyme furin present within the host cell plays an important role for the virus to enter, which was absent in SARS-CoV. Then the virus starts to propagate with limited innate immune reaction and may be detected by nasal swabs. The virus then propagates and reaches the tract. There it faces a more robust innate immune reaction. At this stage, the disease is clinically manifest and an innate response cytokine could also be predictive of the next clinical course. For beta and lambda infections, viral infected epithelial cells are a serious source. The disease are going to be mild for 80% of the infected patients and mostly restricted to the upper and conducting airways. With conservative symptomatic therapy, these individuals could also be monitored and monitored reception. Around 20% of the infected patients will develop pulmonary infiltrates and a few of those will develop very severe disease. The death rate of severe COVID-19 patients are often as high as 49% showed by a recent epidemiological by China CDC. From Wuhan, 292 COVID-19 patients were studied there. Age was the danger factor of severe patients shown by the Lasso algorithm. When the age of severe patients increased by 5, years, the danger increased by 15.15%. Most of the patients with COVD-19 were elderly patients within the severe group with basic diseases. Chronic obstructive pulmonary disease, hypertension, malignant neoplasm, coronary heart condition, and chronic renal disorder were more frequent within the severe group than within the mild group. From 145 severe cases, 51 patients died, accounting for 34.69% and 90.2% dead patients are over 60 years old. 40 patients had the disease out of 51 deaths, accounting for 78.43%. Recent reports show that patients with quite 60 years aged and having comorbidities, especially hypertension are believed to be risk factors for severe disease and death from SARS-CoV-2 infection.

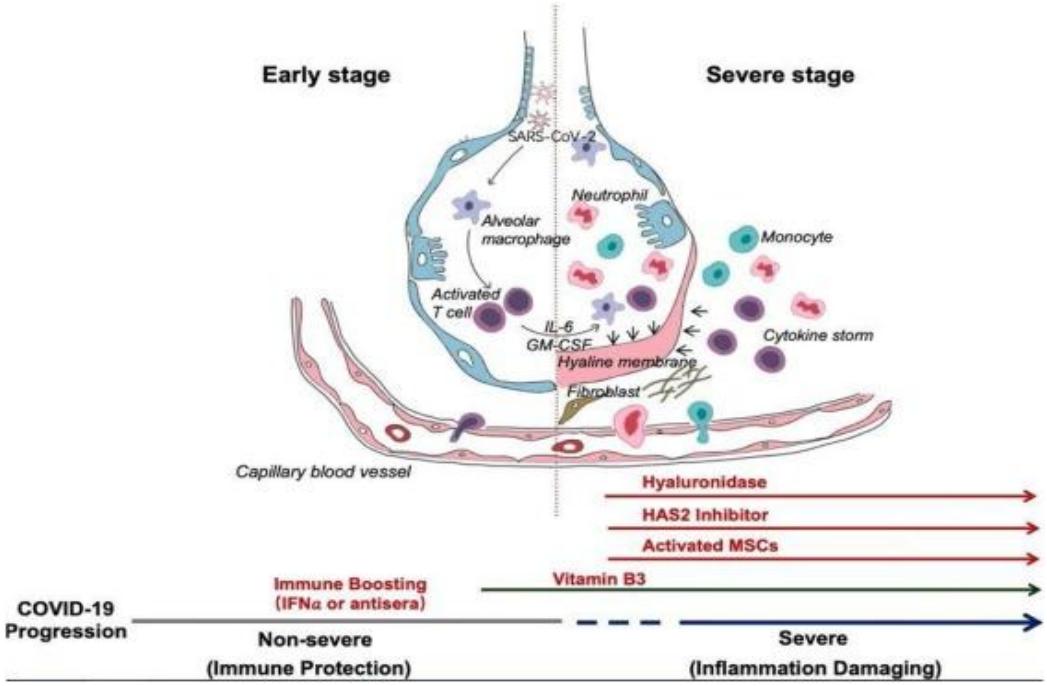
IMMUNE SYSTEM MECHANISM AGAINST COVID 19

As there's no registered medicine or vaccine against COVID-19, our system is that the best defence. The immunity system supports our body's aptitude to defend against pathogens which include viruses, bacteria, fungi, protozoan, and worms, resist infections. As long because the system runs smoothly, we don't notice infections like COVID-19. Our system are often categorized into three categories. They are, namely, natural immunity (rapid response), adaptive immunity (slow response), and acquired immunity acquired immunity is again two types and that they are innate immunity which we receive from our mother and artificial immunity that we receive from medicine. Skin and inflammatory response begins when our

body is affected. However, when our body encounters any germs or viruses for the primary time, the system cannot work properly and that we become sick. An equivalent thing went on within the case of COVID-19.

After being suffering from virus immune responses to mediate antibody. The B cells are assisted by T cells to differentiate into plasma cells, which reciprocally produce antibodies specific to a viral antigen. Neutralizing nature antibody is efficient in fully blocking the virus from getting into host cells to limit the infection and plays a really intense protective role at the later stage of infection and prevents relapse of infection within the future. In contrast, a cellular immunity response are often seen inside the infected cells, which is mediated by T-lymphocytes. The general adaptive immune reaction is directed by helper T cells, while cytotoxic T cells play an important role within the clearance and cleaning of viral infected cells.

Information from SARS-CoV and MERS CoV may allow exploration of data to know how SARS-CoV-2 escapes the host's immune reaction as data on SARS-CoV-2 are still only a few. 80% RNA sequence of SARS-CoV and 50% of RNA sequence of MERS-CoV matches with the RNA of SARS-CoV-2 and SARS-CoV-2 exhibit additional genomic regions. Compared to SARS-CoV and other closely related coronaviruses, its spike protein is 20-30 amino acids longer. Thus, SARS-CoV-2 has similar immune evasion strategies, but a further mechanism remains undiscovered. According to Yufang Shi et al. overall, the synopsis is predicated on some clinical sense. They proposed some normal approaches to the treatment of COVID-19 patients. They believed that the two-phase immune defense-based protective phase and inflammation-driven damaging phase division are essential. During the primary, Doctors should attempt to boost immune reaction and within the second phase suppressing it. Vitamin B3 should be used just after the coughing begins because it is very lung protective. When breathing difficulty starts, hyaluronidase are often given intratracheally and at an equivalent time 4-MU are often wont to inhibit HAS2. Clearly, susceptibility information are going to be provided by HLA typing for strategizing prevention, treatment, vaccination, and clinical approaches.



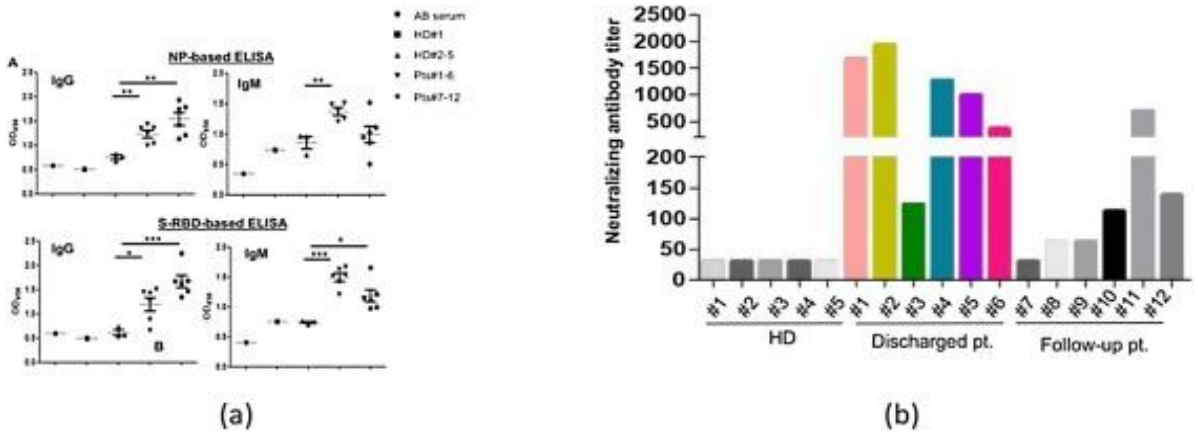
OBSERVATIONS FOR COVID 19 TREATMENT IN IMPROVING IMMUNE SYSTEM: CASE STUDY

The researchers are researching to enhance the system against COVID-19 and here a number of the info are reviewed. 10 proteins are encoded by COVID-19 genome. One among them is that the spike protein (S-protein) mentioned as a glycoprotein exists within the virus infected region. The S-protein may be a significant therapeutic target, ensured its location, and targetable using antibodies. The formation of neutralizing antibodies immunization of animals with S-protein oriented vaccines is extremely effective in preventing infection by homologous coronavirus. If human cells are infected by virus entities, epitopes from any of that viruses' proteins can theoretically be bound and presented by MHC-1 receptors on host cell surfaces that cause stimulation of CD4 and CD8 T cells to impress antibody-mediated and cell-mediated immune responses.

EXAMPLE OF A CASE STUDY

Ling, Ni et al. experimented patients with various methods. Initially they used sera but no significant result observed. Then the team focused on NP and S-RBD. To work out optical dilutions, the serum from a patient and human AB serum were titrated. For IgM a dilution of 1:50 and for IgG a dilution of 1:150 were used. Compared with healthy donor groups, NP- and S-RBD-specific IgM and IgG antibodies were both detected within the area of newly discharged patients in comparison with healthy donors, Anti-SARS-CoV-2 IgG antibodies were also more clearly observed than IgM within the follow-up patients. These findings

clearly indicate that COVID-19 patients mounted IgG and IgM responses to SARS-CoV-2 proteins, especially NP and S-RBD, and suggest that infected patients could maintain their IgG levels, a minimum of for 2 weeks. Because the RBD domain of the S protein has been shown to bind to the human receptor ACE2, the existence of antibodies against it's going to suggest neutralization of SARS-CoV-2 infection. To assess that, they performed a pseudo virus particle-based neutralization assay. Patients 1, 2, 4, and 5, all within the discharged group, had high levels of neutralizing antibody titters. Those findings demonstrate that the majority recently discharged patients had protective humoral immunity to SARS-CoV-2. All except patient 11, the follow-up patients had lower levels of neutralizing antibody titres than recently discharged other patients, although all positive apart from patient 7 being negative.



(a) (b)

FUTURE DIRECTIONS

Both single supplementation studies and preliminary data on MMN indicate some efficacy in treating and reducing the danger of infections, while others show no overall benefits. However, many of the individual studies that comprise these analyses are subject to certain limitations, whether or not they report positive or negative findings. Many of the studies are of low or moderate quality, and are often small trials with poor methodology and inconsistent reporting of efficacy and safety outcomes. More importantly, the micronutrient status of participants before supplementation isn't always recorded. Several are conducted in low- to middle-income countries, making it harder to generalize any results to developed countries. Furthermore, it's been stated that "we can expect only limited success in controlling the consequences of micronutrient deficiencies by tackling one micronutrient at a time", asserting increased multiple micronutrient intake either via the diet, fortification (such like vitamin D , which has greatly reduced the danger of rickets in children, with no questions of safety or supplementation. this is often in line with the very fact that micronutrient deficiencies don't

occur in isolation, which multiple micronutrients are required to support immune function. On the opposite hand, it's been argued that supplementation with micronutrients is useless and a waste of cash variety of researchers from several research institutions subsequently argued that this is often not the case, that the claim is wrong and misinforms the general public, correspondence).

Considering that a lot of people have suboptimal levels of not only one but several micronutrients, which immune defences require variety of micronutrients for optimal functioning, the role of MMN supplementation in treating and reducing the danger of infections must be elucidated in randomized controlled trials. In an early study, the consequences of long-term supplementation with trace elements (zinc 20 mg, selenium 100 µg) with or without antioxidant vitamins (beta carotene 6 mg, A trend for a reduced risk of tract infections was also observed, but just for supplementation with trace elements. An interventional pilot study that's currently underway is evaluating a daily MMN supplement (containing high-dose vitamin C (1000 mg), also as vitamins D (10 µg), E (45 mg), A (700 µg), B6 (6.5 mg), B12 (9.6 µg), folate (400 µg), copper (0.9 mg), iron (5 mg), selenium (110 µg), and zinc (10 mg)) in older adults with no deficiencies in vitamins C and D or zinc. Additionally to its effects on micronutrient status, immune parameters (e.g., phagocytic activity, ROS generation by neutrophils, and levels of inflammatory cytokines), and quality of life, it's also assessing the consequences on self-reported length and severity of illness. Results so far indicate that after 12 weeks of supplementation, the MMN supplement is well tolerated, significantly increases levels of vitamin C and zinc and therefore the production of ROS by neutrophils. Importantly, it significantly decreases the length and severity of self-reported illness. Such studies are important to contribute to and improve the present knowledge domain.

CONCLUSION

MICRONUTRIENTS AND IMMUNE SYSTEM

Every stage of the immune reaction depends on the presence of certain micronutrients, which have synergistic roles supported their complementary modes of action. First, selected micronutrients (e.g., vitamins A, D, C, E, and zinc) are required to make sure the structural and performance al integrity of external and internal surfaces of the body (i.e., the skin and every one mucus membranes), which form physical and chemical barriers that represent a primary line of defence against invading pathogens. Cell-mediated processes of natural

immunity, like cell proliferation, differentiation, function, movement, and therefore the ability to mount an efficient oxidative burst, believe adequate amounts of vitamins A, D, C, E, B6, and B12, folate, iron, zinc, copper, selenium, and magnesium. Similarly, chemical responses like activation of the complement system and therefore the release of proinflammatory cytokines requires certain vitamins and minerals (in particular, vitamins A, D, and C, zinc, iron, and selenium). The inflammatory response bridges the gap between innate and adaptive immunity, and is regulated by vitamins A, C, E, and B6, also as iron, zinc, and copper. Adaptive immune responses encompassing cell-mediated and humoral immunity depend again on the presence of a spread of micronutrients in the least stages (i.e., lymphocyte proliferation, differentiation, and function, and humoral- and cell-mediated immune processes). At an equivalent time, micronutrients are involved in self-protection of immune cells (via antioxidant mechanisms, e.g., vitamins C and E, zinc, iron, magnesium, copper, and selenium), inhibitory actions (vitamins D, B6, and E), and elimination of spent cells via apoptosis and clearance (limiting tissue damage, e.g., vitamin C).

Clearly, micronutrients are an integral a part of the system, and therefore the body needs optimal levels for effective immune function. It's well established that overt micronutrient deficiencies can adversely affect the system and predispose individuals to infections. It's likely that marginal deficiencies also are related to increased risk of infections, although the effect could also be less pronounced than those observed with overt deficiencies. The dietary intake of varied micronutrients is insufficient worldwide, including industrialized countries, which may increase the danger of infection. Additionally, mounting evidence suggests that increased intake of some micronutrients above the RDA may help optimize or maximize immune function and thus improve resistanceto infection. Thus, a niche exists between dietary intakes and levels for optimal immune function, providing a rationale to supplement the diet with micronutrients to assist support the system and reduce the danger of infection.

IMMUNE SYSTEM VS COVID 19

This review on boosting up the immunity system appears a possible resource for the treatment of COVID-19 patients. The method and mechanism of immunity system are often an honest source of data for immunity system development. Recent observations for COVID-19 treatment are often focused on. If potential challenges are often overcome, it are often an excellent achievement. Finally, the suggested food should be consumed to spice up up the immunity system as there's no registered medicine for COVID-19 treatment.

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