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Editorial

Fighting Against COVID-19: Boosting the Immunity with Micronutrients, Stress Reduction, Physical Activity, and Vitamin D

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INTRODUCTION

Micronutrient deficiencies, especially hypovitaminosis D, markedly increases vulnerability to multiple disorders, including non-communicable diseases, such as skeletal and extra-skeletal diseases, as well as communicable diseases. Therefore, in the current COVID-19 crisis, it is of utmost importance to enhance and maintain immunity at the highest possible level [1]. The current situation with the COVID-19 pandemic is unprecedented. It is heartening to see that a few of the larger pharmaceutical companies have agreed to work together to develop armamentaria against COVID-19, including vaccines, anti-viral agents, and testing procedures [2]. With reference to vitamin D, it is recommended to maintain the serum 25 (OH) D concentration in excess of 40 ng/mL (100 nmol/L). Adhering to the actions mentioned in this article will likely reduce the risk of infection with respiratory viruses [3], including COVID-19 [4]. These actions must be carried out in conjunction with the recommended social distancing and avoidance of unnecessary risks, such participating in gatherings.

THE IMPORTANCE OF HAVING A STRONGER IMMUNE SYSTEM

The information presented emphasizes the importance of having a strong immune system that is capable of overcoming COVID-19 and other respiratory coronaviruses [5]. Those with stronger immune systems are less likely to contract respiratory tract viral diseases [6,7]. Age is an independent risk factor for vulnerability for contracting the disease and deaths from COVID-19. Older the age of the affected with COVID-19, the higher the mortality rate, while males are affected more than females [8]. However, older people also have poor immune systems, low serum vitamin D [25 (OH) D] concentrations and thus are not only at high risk of contracting infection but also have poor clinical outcomes. In addition to vitamin D, having adequate sleep, mental stability, proper food, and exercise are also likely to help in maintaining the immunity in old age.

The immune system can be boosted through natural means, such as good mental and physical health practices, consumption of healthful and essential micronutrients, and exposure to sunlight for at least 30 minutes daily with more than one-third of the skin surface exposed [9]; supplementation with orally administered high-dose vitamin D also can be used to boost the immune system [10,11]. If a person using these

measures acquires the disease, signs and symptoms would be milder with fewer complications, and recovery is the norm [12].

IMPORTANCE OF REMAINING CALM AND ENGAGING IN MEDITATION TO OVERCOME STRESS

The COVID-19 pandemic is stressful and affects everyone in every country. Whether the effects relate to health or economics, they are severe and going to last for a while. The elderly and those with comorbidities and who live in high-risk areas are particularly affected by stress, worsening their existing conditions [13,14]. For those who are on the frontline, such as individuals engaged in healthcare, law enforcement, and other essential services, the stress is even greater [15]. As the duration of the pandemic drags on, these individuals should not let stress accumulate within them and thus should practice one or more methods for preventing distress and lessening tension. The accumulation of stress can make individuals irritable and impair their performance, exacerbating the current issues; in rare situations, stress can lead to depression or Posttraumatic Stress Disorder (PTSD) [15]. Meditation would allow meditation practitioners to face the current global COVID-19 pandemic without fear and overcoming it.

Posttraumatic stress disorder is a well-studied entity that is caused by one or more of the following: witnessing or experiencing one or more extreme events or facing situations that lead to sustained stress [16,17]. This stress leads to a switch from the natural, physiologic fluctuations of stress hormones that are inherent to humans and their survival, to a pathologic constant release of adrenaline and corticosteroid [18,19]. Such a sustained high-alert system is not natural and is harmful [13,15]. This abnormal hormone pattern can eventually cause long-term deleterious medical and psychological consequences and functional and structural changes in the brain [13,20]. The latter include restructuring of specific key brain regions such as the amygdala [21,22].

There are multiple ways to achieve flexibility and resilience, including regularly participating in tai chi and yoga, diverting attention to relaxation, doing sensible physical activity, and most importantly, engaging in daily meditation [23]. In addition to providing an understanding of the impermanence of life and developing the ability to accept that reality, most types of meditation improve the ability of practitioners to better manage stress, achieve mental and physical relaxation, and prevent the accumulation of stress and tension. All of these help to enhance the immune system.

AVOIDING FUTURE DEVELOPMENT OF DEPRESSION AND PTSD

Not everyone exposed to severe stress experiences PTSD. There are marked differences in the ability of people to handle acute severe stress experiences and to cope with such stress. Depending on underlying personality and resilience, PTSD can occur in individuals exposed to exceedingly stressful incidents or those who have encountered seemingly fewer overwhelming stressors (e.g., someone in a distant community was diagnosed with COVID-19) [14,24]. In addition to severe exposure to stress, developing depression or PTSD depends on other factors, including genetic susceptibility; past experiences; cultural, spiritual, and personal beliefs; previously experienced bullying and/or harassment; and a lack of workplace, social, and family support [13,25].

It is expected that some people will experience severe depression and PTSD once the COVID-19 pandemic has abated. Those most vulnerable are the frontline workers, such as doctors and nurses who witness patients gasping for breath and tragic deaths in hospitals. Therefore, it is essential for everyone to keep strong mentally and physically and to be open to adapting to and coping with the changing situation. Mental flexibility (i.e., not being rigid) and the ability to develop resilience are key to minimizing long-term complications. In addition, developing resilience positively influences the immune system and is likely to reduce the risks of manifesting a stress-related syndrome related to the COVID-19 pandemic.

REDUCING THE INCIDENCE AND SEVERITY OF COVID-19 BY HAVING VITAMIN D ADEQUACY

In the presence of a weak immune system, COVID-19 multiply exponentially within human cells. These viral loads systematically destroy and reduce the number of functioning pneumocytes, gradually reducing the capacity of oxygenation of blood. In addition, viral actions also markedly stimulate the renin-angiotensin hormonal system (RAS) without having a negative feedback control. This vital attack, generate massive quantities of cytokines, leading to cytokine storm and the acute

respiratory distress syndrome [7], the final common pathway of death.

Complications associated with COVID-19 secondary to cytokine storm are strongly linked to vitamin D deficiency [26]. A Vitamin D sufficiency, markedly sub-due general inflammation, reduce CRP levels, suppress cytokines, and prevents the cytokine storm and severe complications associated with COVID-19 [26]. A major outcome from the cytokine storm is to generate auto-immune attacks against the vascular endothelium. Death of endothelial cells reduces the resilience of the blood-cell barrier, cause leakage of fluid into tissues,including lungs casing pulmonaryoedema and vascular thrombosis. The later initiates another vicious cycle of oxygen transfer across lung tissues to blood and cardiac failure leading to death.

The SARS-CoV-2, COVID-19 uses Angiotensin Converting Enzyme-2 (ACE2) receptors as its vehicle to enter into human cells. The target cells include alveolar cells in lungs, intestinal cells, and mucous membranes. Once COVID-19 enters into cells through the ACE2 receptors, it disrupts the homeostasis and the renin-angiotensin hormonal feedback system, including over production of angiotensin II and reducing the ACE2 concentration [27]. Adequate concentrations of active vitamin D, calcitriol, not only boosts the immune system, but also reverses the above-mentioned over-activation of RAS. The latter process includes the suppression of the super-activated RAS and increases ACE2 concentration that is beneficial to counteract COVID-19 [27]. Collectively, these actions reduce the entry of COVID-19 viruses into human cells, allowing recovery from the disease in most patients.

This is why those with higher serum 25 (OH) D concentrations and thus a stronger immune system has little or no clinical signs and symptoms from it. However as with others, they also get infected with COVID-19 but allow swiftly develop antibodies against the virus and facilitate to overcome from the COVID-19 associated clinical syndrome. Herd immunity occurs when people in the community having antibodies against a particular infectious disease exceeds 60 to 70%. In the case of COVID-19, we are at an early stage. For example, in Santa Clara, Los Angeles and NY State community-based studies revealed it is approximately, 3%. However, in COVID-19 epicentres, as in Gangelt in Germany it is 14% and in New York city, the immunity is about 14%. There is a long way ahead, prior to be able to achieve protection through the herd immunity and therefore, should not be relied upon.

CONCLUSION

Overall health of humans depends on having a balanced diet with adequate micronutrients, a clean environment, and the ability to adjust and cope with stress, adequate sleep, and rest, and engaging in reasonable physical activities; all of these lead to mental and physical well-being. The current COVID-19 pandemic impairs all of these mentioned aspects. Therefore, to remain healthy, one should be mindful of not neglecting the mentioned key elements of a healthy life. These are also essential to maintaining a strong immune system to minimize environmental, microbial, and other external threats that we constantly face. It is noteworthy that those with strong immune systems will be affected minimally by a COVID-19 viral infection and allow a fast recovery.

Those with vitamin D deficiency are more susceptible to contracting COVID-19, in part because of their weaker immune systems and having comorbidities. It is recommended that each country immediately start a nationwide campaign through the mass media to highlight the importance of maintaining a strong immune system and practical ways to achieve the goal of reducing the incidence of and complications associated with COVID-19 infection.

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