

Review

An insight into the prevailing trends of self-immunity and lifestyle in protection from Covid-19 amongst the health care workers

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Abstract The coronavirus disease-19 (COVID-19) or SARS-CoV-2 pandemic has exerted a heavy toll worldwide and threatens to overwhelm the healthcare resources of any country. This situation of an international concern also poses a personal hazard to all kind of medical professionals, especially on healthcare workers (HCWs) on the front lines fighting the virus. In the fight against COVID-19, Health care workers (HCWs) are a crucial human resource for hospitals. Infection with and death of HCWs not only compromise the workforce in health care settings but also affect the morale of HCWs and can cause public panic. As cases grow, the likelihood of each one of us contracting COVID-19 grows with it. As the vaccine will take some more time to be readily available, we also require defending ourselves beginning right from within our body by strengthening the immune system besides following the universal precautionary measures. Many aspects impact the working of the immune system. A healthy lifestyle includes not only eating nutritious food but also practising of good habits like walking and regular exercises, maintaining good emotional and mental health and taking adequate rest. Therefore, the responsibility of the individuals during the COVID-19 pandemic lies in making an effort to choose a healthy lifestyle, and take optimum rest. This article will shed light on means how good health and a healthy immune system can be achieved by building up our self-immunity and following a healthy lifestyle.

Keywords: Coronavirus, COVID-19, Front lines, Healthcare workers (HCWs), Lifestyle, Mental health, Pandemic, SARS-CoV-2

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Introduction

The coronavirus disease-19 (COVID-19) pandemic has exerted a heavy toll worldwide and threatens to overwhelm the healthcare resources of any country. This situation of an international concern also poses a personal hazard to all kind of medical professionals, especially on healthcare workers on the front lines fighting the virus. Physicians are at risk of acquiring the infection via patients who may be

symptomatic with the disease or are asymptomatic carriers. Many of these affected health workers are not only at risk of losing time spent in the workplace due to these exposures but also a personal loss from this illness that requires hospitalization and involves high morbidity and mortality. At present, the functional healthcare settings globally are not designed to deal with the pattern of the rapid spread of COVID 19. In many parts of the world, the

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availability of medical resources is limited and unevenly distributed and, hospital settings are not well equipped. There are no adequate and accurate data about the numbers of COVID-19 infections and deaths of healthcare workers. In May 2020, the International Council of Nurses (ICN) stated that COVID-19 had infected at least 90,000 healthcare workers and more than 260 nurses had died due to COVID-19 pandemic so far. Notably, clinicians 60 years of age and older have a higher probability of the threat, since 80% of deaths in China occurred more in this age group. [1,2].

Globally, as of 10 August 2020, there have been 19,718,030 confirmed cases of COVID-19, including 728,013 deaths, reported to WHO [3].

As cases grow, the likelihood of each one of us contracting COVID-19 grows with it. In anticipation of this elevated anxiety, a large proportion of dentists have shut down their practices which are causing them significant financial losses and frustrations. It might prevent them from getting infected, but in the long run, it will only increase the sufferings of the individuals needing immediate dental care [4].

Henceforth, it becomes necessary if health professionals work on means of making themselves immune to this virus. As the vaccine will take some more time to be readily available, few are considering exposing themselves early on, gambling will be one of the lucky mass with mild symptoms [5].

While we are protecting ourselves from the virus from outside by various precautionary measures, we also require defending ourselves beginning right from within our body by strengthening the immune system. The immune system is quite complicated and to a great extent, influenced by the extrinsic factors surrounding us. Many aspects impact the

working of the immune system. A healthy lifestyle includes not only eating nutritious food but also practising of good habits involving walking and exercising regularly, maintaining good emotional and mental health and taking adequate rest. We need to understand that these factors play a significant role in regulating and boosting immunity [6].

One of the ways of achieving a healthy immune system is eating right. It is because our gut and immunity are inherently linked and synergistically connected. When our gut is healthy, all is hale and hearty with the immune system. So, it should come as no surprise that eating healthy foods leads to a healthy microflora, which results in a healthy immune system capable of fighting off infection quicker [1]. The 2014-2016 Ebola virus outbreaks in Western Africa demonstrated that immediate supportive care significantly reduces case fatality rates. It may apply as well to the current SARS-CoV-2 (or COVID-19) pandemic that is ravaging the world [7-8]. Since the outbreak of the COVID-19, individual and community resilience emerged as an important resource while remaining the first line of defence in emergency preparedness. Psychological and behavioural countermeasures of both the individual and the community are vital determinants to improve resilience and enhance the efficacy of public health approaches vis a vis a pandemic of a magnitude similar to that of COVID-19. Health workers are at the front line of the COVID-19 outbreak response and exposed to hazards that put them at risk of infection. Hazards include pathogen exposure, long working hours, psychological distress, fatigue, occupational burnout, stigma, and physical and psychological violence [9]. A primary challenge in the COVID-19 pandemic has been to take care of infected patients, which defines a grave risk to the workers at

intensive care units (ICUs) because of the need for constant contact with infected patients for extended periods. Widespread infection and fatalities among the HCWs have been reported previously for MERS and SARS and currently for the COVID-19 disease, imposing considerable amounts of social and mental pressures on the workers. During the outbreaks of SARS and MERS, the HCWs reported concerns about themselves and their families' health and, explained their painful experiences of fear, anxiety, job burnout, mental pressure, anxiety, and depression symptoms [10-11].

The ecology of adversity and resilience demonstrates that substantial stressors, such as inadequate nutrition, can lead to long-lasting effects that are linked, to health [12]. In fact, poorly nutritious diet quality has been associated not only with physical but also mental health. The nutritional status of individuals has for long been considered as an indicator of resilience against destabilization and can transcend the individual, the community to reach global influence [13].

This article will shed light on means how good health and a healthy immune system can be achieved by building up our self-immunity and following a healthy lifestyle.

Groups at risk of the complication type Covid-19

So far, the universal consensus is that spread of COVID-19 mostly occurs via respiratory secretions in the form of large respiratory droplets which fall from the air after transported up to six feet. The situation becomes critical if the viral particles get converted into a fine spray of aerosols via coughing, sneezing or oro-dental procedures. These aerosol particles have the capacity of being transported to a larger area, approximately up to 20 feet, from an infected person and then cause secondary infections at a distant place. These aerosol droplets can

remain suspended for longer duration in closed settings and thus may result in surface contamination, and, infection of the health professionals [14].

In the fight against COVID-19, Health care workers (HCWs) are the most crucial human resource for hospitals. Infection with and death of HCWs not only compromise the workforce in health care settings but also affect the morale of HCWs and can cause public panic [15]. Although the source of transmission are the patients showing symptoms of COVID-19, of late, there are reports that patients in their incubation period and who are asymptomatic are carriers of SARS-CoV-2, thereby increasing the risk of spread to close contacts and health-care workers. The risk of cross-infection is also higher between dentists and patients because of the proximity during the dental procedures [4].

In general, people over the age of 65 are more likely at risk of catching Coronavirus. Also, in various studies, obesity has been considered as one of the concerning areas in the development of severe and critical types of COVID-19 manifestations. In this regard, it is necessary to determine the patient's with BMI upper than five. At present, the following two groups of the patients are at the potential risk for COVID 19 complications. Group A - Patients with immunodeficiency or on corticosteroids therapy (more than 20 mg / d prednisolone for more than two weeks or on a cumulative dose of more than 600mg) or undergoing chemotherapy sessions. Group B- Patients with underlying disease, Hypertension, Uncontrolled diabetes with% HbA1c>7.6, Cardiovascular disease other than hypertension, BMI>40, Chronic underlying respiratory conditions, Chronic renal failure[16,17].

Immunity by using fresh fruits and vegetables

Compelling evidence showed that dietary habits are affected by conditions of stress, distress, and emotional disturbance, whereby elevated distress levels are associated with unhealthy dietary patterns and poor quality of the diet. Furthermore, emotions like fear and sadness are associated with less desire or motivation to eat and with lessened enjoyment during eating [18,19].

Therefore, the responsibility of the individuals during the COVID-19 pandemic lies in making an effort to choose a healthy lifestyle, eat diets high in fruits and vegetables, exercise during free time, try to maintain a healthy weight, and get an adequate amount of sleep.

Corona is a virus that is affecting all countries of the world these days. Still, by implementing nutritional strategies and strengthening the immune system with a healthy and balanced diet, the virus can be prevented to a large extent. The most important principle in nutrition to have a healthy body is to observe variety and balance in the daily diet. Each person's calorie intake should be commensurate with their individual needs. During this period, very low-calorie and strict diets, such as diets with less than 1,200 calories, should be avoided. In such a situation, the consumption of fruits and vegetables should be seriously considered by us because these two groups, due to their high amounts of vitamins and antioxidants, help the immune system to prevent coronary heart disease. Coloured fruits high in vitamin C, such as oranges, tangerines, or pomegranates, as well as dark green leafy vegetables such as lettuce or spinach, are good choices for preventing COVID-19. The fear and anxiety associated with the Coronavirus outbreak have resulted in significant changes in the dietary patterns globally [20,21].

Plant colour determines the nutrients in the plant, and some of them have beneficial effects on the immune system.

"The more fruits and vegetables you eat in different colours, the more nutrients you consume. Which improves the functioning of the immune system? Also, vitamin A is one of the sources that are very effective in strengthening the immune system. Carrots and pumpkin are also good sources of vitamin A. Orange is also one of the healthy food flavourings and is another way to get vitamin C and strengthen the immune system. Green tea and coffee are also recommended daily in the amount of one cup due to having appropriate amounts of antioxidants.

Nuts such as walnuts, pistachios, and almonds also play an important role in the body's immune reactions and functions due to their high levels of iron and zinc, and it is recommended by health experts to consume one unit at least daily. In addition to these recommendations, there is a lot of emphasis on water and fluid consumption. Usually, an adult woman needs 8 to 10 glasses of water and men 10 to 12 glasses of water and fluids daily. Proper use of water and fluids throughout the day and continuously leads to better excretion of possible viruses from the gastrointestinal tract. Also, one of the suggested ways to strengthen the immune system and proper consumption of fluids for children is to prepare high-calorie and tonic potions.

The combination of milk, bananas, or dates and nuts such as walnuts and almonds with oats is a high-calorie snack and strengthens the immune system for children. Besides, although proper consumption of meat and protein guarantees health and safety in the body, it is important to pay attention to the type of cooking of that protein. Meat or fish or eggs should be fully cooked and not undercooked because otherwise, the risk of coronary heart disease increases, and you should avoid fast and high-fat foods and cook and eat at home as much as possible [22,23].

Role of Dietary antioxidants and ORAC insulating food items

The Institute on Medicine has defined a dietary antioxidant as “a substance in foods that significantly decreases the adverse effects of reactive species (Oxygen and Nitrogen species) on normal physiological function in humans.”

Active Oxygen helps in for defence against viruses, microorganism or different foreign bodies. However, once active Oxygen becomes abundant, it harms the body; thereby it is erased by antioxidants in the exclusion system of the living body to preserve the health condition. Antioxidants being the branch of Nutraceuticals have a decisive role in health maintenance and promotion.

Antioxidants are substances that are present in the body in minute concentrations, delaying, controlling or preventing oxidative processes leads to deteriorating food quality or the onset and spread of degenerative diseases in the body [24].

Oxygen Radical Absorption Capacity (ORAC) Measures the ability to break the radical chain and monitoring the inhibition of oxidation caused by peroxy radical [25]. This assay has been to provide a parameter reflecting antioxidant activity in food, which suggests the cumulative capacity of food components to inhibit free radicals [26]. Hence, ORAC values have been considered by some to be of biological importance as a reference for antioxidant effects [27].

Fruits and vegetables are good sources for maintaining the health of the body and prevent diseases. Also, they can reduce oxidative stress [25]. There is ample evidence stating that a plant-based diet with a high intake of fruits and vegetables may reduce the risk of oxidative stress-related diseases [28]. In epidemiological studies, it

has been observed associations between diets rich in antioxidant nutrients and a reduced incidence of cancer [29]. Among vegetables, spices and herbs are rich sources of antioxidants. For example, several studies have shown that spices and herbs such as rosemary, sage, and oregano are known to be good antioxidants [30]. Most of the spices and herbs analysed have particularly, high antioxidant contents [31] and have a high have ORAC values. ORAC assay has been used widely in many recent studies of plants [25] and reported that the antioxidant activity of them is due to the presence of antioxidants such as flavones, isoflavones, flavonoids, anthocyanin, coumarin lignans, catechins and isocatechins [31].

Inclusion of Spices and herb in the diet

Herbs and spices have been used, as a food additive, and they can increase the shelf life by the elimination of foodborne pathogens [32]. Today, many of the spices and herbs are used, as medicinal plants. The reported, spices and herbs to have positive effects in the treatment of some complex diseases. For example, the cancer cell growth and cytotoxicity are inhibited, by using some medicinal plants such as *Myristicafragrans*, *Garcinia gummi-gutta*, *Gymnema Sylvestre*, *Picrorhiza kurroa*, *Linum tiatissimuma* and the clinical trials have found this compound non-toxic to human cell [33]. Also, several research studies have investigated the effectiveness of plant-based inhibitors like α -amylase and α -glucosidase for their antidiabetic and, antioxidant properties [34]. Some spices, such as *cinnamon*, *ginger*, *turmeric*, *fenugreek*, *garlic* and *black cumin*, are efficient in diabetes management [35]. In few clinical trials in humans and animals, many medicinal plants such as cinnamon, ginger, turmeric, cumin, coriander, anise, fenugreek, garlic, onion,

cloves, mustard, black pepper and curry leaves were able to reduce the glycemic response [36]. In the review study of the effect of herbs on hypertriglyceridemia have reported that many plants have beneficial effects but, *Allium sativum*, *Nigella sativa*, *Curcuma longa*, *Anethum graveolens* and *Commiphora mukul* had the best TG(triglycerides) lowering effect [37]. In patients with liver-related diseases, the popularity of medical plants is increasing, as at least a quarter of such patients use medicinal plants [38]. Some of the medicinal plants such as *Crocus sativus* (*C. sativus*), *Nigella sativa* (*N. sativa*), *Coriandrum sativum* (*C. sativum*), *Ferula assafoetida* (*F. assafoetida*), *Thymus vulgaris* (*T. vulgaris*), *Zataria multiflora* (*Z. multiflora*) and *Curcuma longa* (*C. longa*), have been reported to increase acetylcholinesterase activity, which is important in neuro-inflammation and neurotransmitter deficiency such as AD and depression [39]. Also, promising influence of natural medicinal sources over the composition of the microbiota can reduce inflammation.[40]. Furthermore, Plant extract therapies have a potential in controlling asthma symptoms and reducing the level of biomarkers of inflammation.[41]. Many herbs are known to display immunomodulatory activities. Aloe vera, *Angelica gigas* (Korean angelica), *Astragalus membranaceus* (Mongolian milkvetch), *Ganoderma lucidum* (lingzhi mushroom), *Panax ginseng* (ginseng), and *Scutellaria baicalensis* (Chinese skullcap) exhibit immunomodulatory properties [42]. Their activities are based, on selectively stimulating cytokines, activating lymphocytes, increasing natural killer cell counts, and enhancing macrophage actions. Using these immunomodulatory properties of herbs, they can be used to strengthen the immune system and protect the body against COVID-19 [43]. Even in the latest version of China

Guidelines, some drug and herbal formulas are recommended for the treatment of COVID-19[44]. Also, antioxidants are crucial for our immunity as they help in increasing the number of T-cell subsets, increased interleukin-2 production and potentiated natural killer cell activity [45]. So, medicinal plants with antioxidant activity can help in the management of immune disease such as COVID-19.

Role of Dietary supplements in Boosting the Immunity from COVID-19

Some evidence shows vitamins C, D, E, and zinc supplements are beneficial for respiratory infections with symptoms similar to COVID-19. Some studies have reported that vitamin C, may reduce the susceptibility to lower respiratory tract infections like COVID-19[46]. A few researchers found some correlation between vitamin D and COVID-19 cases, while other studies did not demonstrate any significant correlation when confounding variables were adjusted. Also, Vitamin D supplementation is known to have protective effects against respiratory infections, so people at risk should be advised vitamin D supplements for better protection [47]. Numerous studies have shown that vitamin E deficiency impairs immune functions. Intake of vitamin E may enhance the immune system. Older people are more susceptible to infection due to their compromised immunity, hence prescribing vitamin E to them, is worth considering for its potential benefits against COVID-19. However, so far, there is little evidence for the use of vitamin E as a preventative or therapeutic agent against COVID-19[48]. Till date, there is no evidence in medical literature evaluating zinc for COVID-19 management, yet, a few trials are currently registered, to test zinc as part of a regimen to treat

COVID-19, but cannot be proven, successfully[49,50]. Based on the recent discovery and revised evidence on the management of coronavirus, oral probiotics also play a beneficial role in the intestinal and systemic effects of COVID-19. Therefore, the use of probiotic supplements can also help in boosting immunity [47].

Role of physical and mental exercises

Several studies have found that healthcare workers fare no better than the general population when it comes to non-communicable diseases such as diabetes and hypertension, as well as cardiovascular diseases. Many health care workers are addicted to smoking, consume alcohol, eat junk food, sleep erratically, and remain obese with little physical exercise despite knowing the health risks that they pose. This shows that we do not always “practice what we preach” [51].

Moderate exercise has shown to improve the flu-fighting power of vaccines in seniors. But during the outbreak, stay away from exercise partners. Regular physical activity benefits both the body and mind. It can reduce high blood pressure, help manage weight and reduce the risk of heart disease, stroke, type 2 diabetes, and various cancers - all conditions that can increase susceptibility to COVID-19.

The World Health Organization exemplifies some practical home-based exercises, available at their website, including squats, bridges, back extensions, and chair dips, to be performed for 10–15 repetitions up to five times with 1-min rest between sets [52].

WHO has recommendations on the amount of physical activity people of all ages should do to benefit their health and wellbeing. All adults should do at least 150 minutes of moderate-intensity physical activity throughout the week,

or at least 75 minutes of vigorous-intensity physical activity throughout the week.

- For additional health benefits, adults should increase their moderate-intensity physical activity to 300 minutes per week, or equivalent.
- For developing and maintaining musculoskeletal health, muscle-strengthening activities involving major muscle groups should be done on 2 or more days a week
- Besides, older adults with decreased mobility should do physical activity to enhance balance and prevent falls on 3 or more days per week.

Solo exercises include jogging, jumping rope, and a variety of at-home workouts from yoga to HIIT (High-intensity interval training). Even a small amount of movement, like a walk around the block, can make a difference. It is also healthy for our mental health - reducing the risk of depression, cognitive decline and delay the onset of dementia - and improves overall feelings

Some prefer gardening, which can also be great exercise. You can reduce stress through breathing exercises, meditation, working out, talking to a therapist, and getting out into nature, along with many other ways [53].

The correlation between our immune system, and physical exercises have been extensively studied in recent times. Evidence indicates that moderate and/or, vigorous exercise has anti-inflammatory effects, suppressing abnormal production of inflammatory cytokines. With the prevailing COVID-19 pandemic it is a big challenge to maintain an active lifestyle and/or, our exercise routine. Since most of our daily movement restricted during the coronavirus pandemic, it can be difficult to keep up an exercise routine [54]. Many personal trainers and gyms are offering virtual sessions and classes, which can help keep you accountable and give you a social connection. For free workouts,

YouTube is a great resource. You can find virtually any type of exercise at any workout length or intensity you're looking for. There are also many apps, both paid and free, that offer guided workouts and routines. Physical activity helps improve all aspects of your health, including boosting your immune system. It also reduces stress and anxiety and improves mood., which in turn helps you sleep better and prevents burnout. Exercise also releases endorphins, chemicals in your brain that revitalize your mind and body. If you use exercise to keep up your energy and spirits in trying times such as these, you might be less inclined to turn to unhealthy coping mechanisms, like drinking too much, which does wear down your immune system [55].

The right amount of quality sleep and fight insomnia

Getting the right amount of quality sleep can help your natural infection resistance, too. In the present scenario, it is a serious concern as the Coronavirus attacks the immune system. In this pandemic time, patients with the virus and front-line medical workers face the brunt of the direct impacts of the disease. There are robust shreds of evidence to suggest the role of sleep in strengthening immunity. Sleep quality is a key indicator of health. For clinical staff, good sleep quality not only helps them to work better to treat patients but also maintains optimal immune function to prevent infection. Several studies confirm the link between sleep and a healthy immune system. For most adults, that means 7 to 9 hours of uninterrupted slumber. Sleep is critical to physical health and effective functioning of the immune system. It's also a key promoter of emotional wellness and mental health, helping to beat back stress, depression, and anxiety. A lack of sleep causes degenerative effects throughout the entire body, so the

immune system will not work as efficiently when you are sleep deprived.

Sleep Increases T Cell and Cytokine Production which are vital in defending against harmful pathogens. Additionally, sleep affords the immune system the chance to recoup and re-evaluate how best to attack invaders. Without enough rest, it will have a difficult time developing antibodies and keeping up defences. We should set a proper sleeping Schedule and Routine. Establishing a routine can facilitate a sense of normalcy even in these extra-ordinary times. It is easier for your mind and body to acclimate to a consistent sleep schedule, which is why health experts have long recommended avoiding variation in your daily sleep time. Sleep is a necessary physiological process, and during our combat with the COVID-19 pandemic, sleep becomes even more crucial for the health professionals, because of its enormous benefits on physical and mental wellbeing [56].

The fast spread of COVID-19, and limited options of treatment, place stress on society at various levels, and the healthcare personnel which are overburdened [57-58]. Moreover, these health workers risk their own lives while treating diseased. Recuperative sleep will enhance the immunity against novel Coronavirus, and, this message needs to be spread to a larger section of society. Not only these health workers but also every person having primary or secondary contact with the diseased should have sufficient rest and sleep [59].

Optimal sleep health is essential for the wellbeing of HCW, and thus the provision of safe patient care. Create a sleep schedule and enhance the sleeping environment by restricting screen time such as Television or phone. Avoid electronic light (blue light) at least 2 hours before bedtime. The light from electronic screens can interfere with melatonin production—making it difficult to fall asleep.

Last but not the least be cautious with the intake of alcohol and caffeine, especially later in the day, as both can disrupt the quantity and quality of your sleep.

Conclusion

COVID-19 is highly contagious, and till date, we do not have any concrete solutions, on how to manage it effectively. The lack of a definite cure for the infection makes work of health professional even extra tough, and there is also the added pressure of calming the nerves of the patients and their families. Healthcare industry is one of the most hazardous environments to work. Employees in this industry continuously get exposed to a complex variety of health and safety hazards in the course of their work. Over the past five months, frontline workers have become used to the physical and mental toll of working long shifts in sweaty PPEs and boosting the morale of patients and families. They feel a sense of pride in serving their country in such difficult times. The need of the hour is to prioritize building up their self-immunity by following a healthy nutritious diet and lifestyle.

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Conflicts of Interest

None of the authors have any conflicts of interest associated with this study.

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