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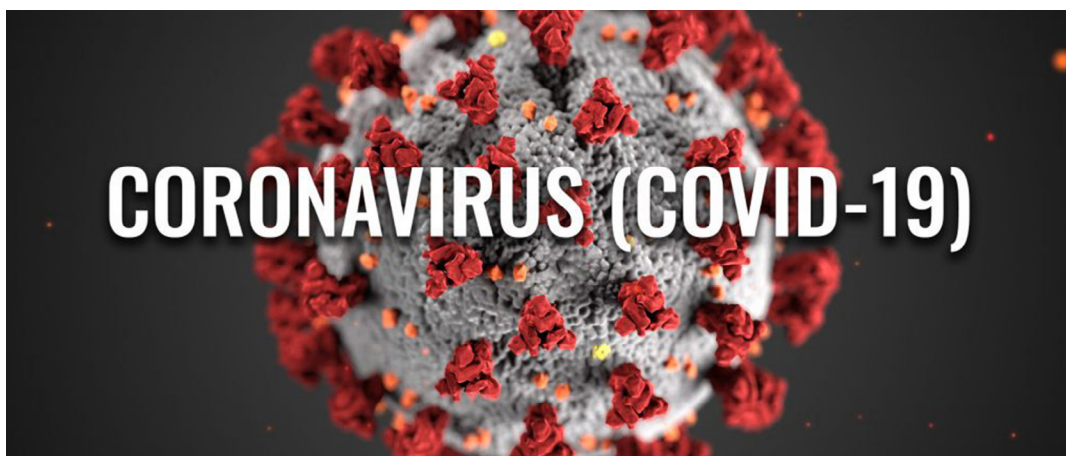
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Significance of conventional Indian foods acting as immune boosters to overcome COVID-19

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33.1 Introduction

The COVID-19 pandemic is enforcing every individual in this world to have a robust diet (Aman and Masood, 2020). The immune system remains the first line of defense against disease causing microorganisms and other noxious substances. It is a multifaceted system of cells and proteins that protect the body against infections. There are many factors influencing an individual being healthy or becoming sick based on their immunity. This entirely depends on an individual; the consumption of foods on regular basis in terms of quality and quantity. For a strong immune system, the body requires essential energy, nutrients with all vitamins, minerals, and herbs (Arshad et al., 2020). Moreover, it is important to understand that a strong immunity is not built overnight but is possible only by consuming healthy foods that have high nutritional values on a regular basis.

Immune system has different types of components. Type 1 is innate immunity. It acts as barrier from bacteria, viruses, and parasites. Chemical cells can rapidly raise the alert and begin to fight off the virus. The symptoms for COVID-19, such as sore throat, body aches, cold, cough, and fever are not caused by the virus itself, but triggered by our own body, as part of innate immune response. Type 2 is skin, airways, and mucus membrane that provides a barrier to infection. But once the virus gets past these defenses, it is necessary to induce the innate immunity (Alberts et al., 2002). Type 3 is known as adaptive immunity, which is composed of systemic cells and processes to

keep away pathogens by preventing their growth (Merlo and Mandik-Nayak, 2013); (John Wherry and Masopust, 2016). Usually this is given in the form of vaccine. Type 4 is herd immunity. This protects indirectly from infections especially, during either epidemic or pandemic through vaccination or previous infections (John and Samuel, 2000). Type 5 is nutritional immunity, which tries to limit the pathogens that causes infections by including minerals in the diet (Hood and Skaar, 2012).

Lysozyme (chemical cell), an enzyme, is a powerful tool for innate immunity. It has the most antibacterial and antiviral properties (Invitra, 2011). The bacterial growth is inhibited by peptidoglycan cell walls. It is very useful in molecular biology as it can perform cell lysis, an essential process in extraction of recombinant DNA (Eshdat and Sharon, 1977). Saliva is one of the sources of Lysozymes. It can be generated through saliva by consuming conventional Indian foods. Salivary glands help to protect from numerous microbes in the mouth by producing immunoglobulin A (IGA) antibodies. It binds to mucus layer that covers the epithelial lining of the oral cavity and acts as a barrier against potentially dangerous pathogens. Adequate salivation is a good sign of immune response.

Conventional Indian foods containing functional components like antioxidants, dietary fibers, and body healing chemicals are the primary sources for the immune system and can produce lysozyme. The processing techniques, such as soaking, sprouting, and fermentation further enhance functional properties of the Indian foods (Sarkara et al., 2015). Vitamins, minerals, and herbs are equally important for enhancing the immunity. Considering the past studies and importance of the diet to maintain good immunity, the present study has focused only on the traditional foods to raise awareness of every individual, which could develop immunity and resist any kind of contagious diseases.

33.2 Methodology

Few case studies of affected COVID-19 patients were collected and presented in the study. Conventional foods that can produce lysozyme, antioxidants, and vitamins, such as water and fat soluble, minerals, and herbs are the most important immune boosters that were considered for the study to maintain good health and help to prevent COVID-19 as well as other infectious diseases. Along with the abovementioned foods, few techniques such as soaking, sprouting, and fermentation were also discussed.

33.3 Results and discussion

It was evident from the case studies data (Table 33.1) that dietary habits played a major role to overcome COVID-19 in spite of their previous health history. Few studies reported that blood group O and B are less vulnerable compared to A and AB (Barnkob et al., 2020; Hoiland et al., 2020). But in the present case studies, many of the affected patients are O +ve and B +ve. So the virus may attack any individual depending on the environment or type of attacking strain in virus and also those who have less immunity. Irrespective of the age groups of the individuals; poor diet increases severity. Out of 16 case studies, only two cases lead to fatality. Hence it is necessary that enriching with all types of foods in the regular diet discussed as follows will definitely help every individual to prevent or overcome from COVID-19.

33.3.1 Lysozyme foods

Viral infections like Cytomegalo virus and Epstein Barr virus were identified that the spread of virus is via saliva (De França et al., 2011). Even studies reported that saliva is one of the causes for transmission of COVID-19 (WHO, 2020; Xu et al., 2020). Since the saliva is one of the sources for transmission of viruses, intake of lysozyme foods would improve the immunity right from oral cavity and so the carrier of virus via saliva would be under control. Few vegetables and fruits have high concentrations of lysozyme (Chandan and Ereifej, 1981). Citrus fruits like lime and orange help to maintain saliva. Eating directly the lysozyme foods in the form of salads or by cooking on regular basis helps to sustain and be healthy. The reasonable way of improving the enzyme lysozyme naturally through saliva is by preferring Indian curd, which is equally important for healthy bacteria of the gut.

33.3.2 Antioxidants

In general, corrosion of iron takes place by constant exposure to air or oxidation. Our body also functions in the same way. Oxidative stress and free radicals are linked to numerous diseases. The stress of modern lifestyle compels to experience the pollution from environment, emotional fatigue, and radiations released from smart phones and

TABLE 33.1 Case studies of affected COVID-19 patients with all details.

Case Study	Gender	Type of Blood Group	Age	Regular dietary food habits on daily basis	Previous health history	Type of Symptoms developed and Date	Date of Testing	Type of COVID testing	Severity	Type of Quarantine	Effect of COVID-19	Diet during treatment along with medication	No. of days undergone for treatment	Date of re testing	Date of discharge/ Fatality/ Remarks	Recommended diet to regain immunity
1	Male	B+ve	27	Low Vitamin C foods, fruits and nuts consumption is low, intake of green leafy vegetables is medium	—	Fever, sour throat, cold and sever cough from 30.06.2020	07.07.2020	Initially Chest X-ray and fol-lowed by PCR	Severe	Hospitalized	Accumulation of fluid into Lungs and Pneumonia	Lemon, fruits, dry fruits and nuts, diet includes one green leaf vegetable and rice	18	23.07.2020	24.07.2020	Fruits- papaya, orange, lemon, guava Vegetables—green leaf, carrot, beetroot Curd and dry fruits
2	Male	B+ve	52	Millet, Fruits, Dry fruits, vegetables	Brain problem and Diabetics	Fever, cough from 02.07.2020	04.07.2020	Antigen test	Mild	Home Quarantine	Severe weakness	Papaya, Fruit juices, rice and egg	10	18.07.2020	Recovered	Vitamin C foods, egg, probiotic foods
3	Male	O+ve	57	Millet-Raagi, curd, green vegetables, rice	Diabetic	Sever cough from 12.07.2020	16.07.2020	Chest CT	Severe	Hospitalized	Lung infection, High Lactate Dehydrogenase and Ferritin	Vitamin C foods, dry fruits, curd rice, Wheat dhapatti, paneer	8	PCR test on 23.7.2020	Discharged on 25.07.2020 with weakness and high sugar levels	Fruits, vegetables and probiotic foods
4	Female	B+ve	49	Lemon, Millets, Green leafy vegetables, fruits, carrot	—	Asymptomatic	23.07.2020	Antigen test	Very mild	Home Quarantine	—	Vitamin C foods, dry fruits, fruits-papaya, guava, curd	—	Not tested	Recovered	Vitamin C, vitamin B complex foods, vitamin E and Zinc
5	Male	B+ve	41	Vitamin C foods, green vegetables and leafy vegetables	—	Fever from 01.08.2020	08.08.2020	IgM-IgG rapid test	Very mild	Home Quarantine	—	Vitamin C foods, fruits, dry fruits and nuts,	14	Not tested	Slight weakness	Vitamin C, vitamin B complex foods, vitamin E and zinc
6	Male	B+ve	72	Vitamin C foods, green vegetables and leafy vegetables	Diabetic and Thyroid	Fever from 04.08.2020	06.08.2020	Antigen test	Severe	Hospitalized	Started with chest infection and affected to Heart, Kidney and Liver	Only medication in ICU	10	—	Lead to Fatality	—

(continued)

TABLE 33.1 (Cont'd)

Case Study	Gender	Type of Blood Group	Age	Regular dietary food habits on daily basis	Previous health history	Type of Symptoms developed and Date	Date of Testing	Type of COVID testing	Severity	Type of Quarantine	Effect of COVID-19	Diet during treatment along with medication	No. of days undergone for treatment	Date of re testing	Date of discharge/ Fatality/ Remarks	Recommended diet to regain immunity
7	Male	B+ve	11	Diet is rich with vitamin C, ginger, dry fruits and vegetables	—	Fever from 08.08.2020	09.08.2020	IgM-IgG rapid test	Very mild	Home Quarantine	—	Vitamin C foods, Fruits, dry fruits and nuts,	10	Not tested	Completely recovered	Vitamin C, vitamin B complex foods, vitamin E and Zinc
8	Male	B+ve	46	Diet is not much rich with vitamin C, vitamin B and vegetables	—	Fever	14.07.2020	PCR	Severe	Home Quarantine	Lungs	Vitamin C, Vitamin B, Vitamin D supplements	10	PCR test on 28.07.2020	Recovered	Dry fruits, zinc intake, Fruits and green leafy vegetables
9	Male	O+ve	50	Very poor diet and no proper vitamin foods	Diabetics	Fever, body pains	06.09.2020	PCR	High risk	Hospitalized	Brain attack	—	5	—	Lead to Fatality	—
10	Male	B+ve	31	Low vitamin C foods, less consumption of fruits and vegetables	Asthma	Asymptomatic	04.08.2020	Antigen test	Mild	Home Quarantine	—	Vitamin C, Green leafy vegetables, curd, carrot, banana, beetroot	14	17.08.2020	Recovered	Dry fruits along with the regular diet preferred
11	Male	O+ve	50	Rich in vitamin C fruits, dry fruits, all vegetables	Diabetic	Fever, dry cough, diarrhea and headache from 28.08.2020	30.08.2020	Antigen test	Severe	Home Quarantine	Weakness	Continued with vitamin C foods, dry fruits and green leafy vegetables	15	11.09.2020	Recovered	Vitamin C foods, dry fruits and green leafy vegetables
12	Female	O+ve	45	Vitamin C foods, carbohydrate, herbs, and spices	Asthma	Fever, dry cough, and severe headache from 28.08.2020	30.08.2020	Antigen test	Severe	Home Quarantine and hospitalized after 10 days	Severe weakness and asthma	Vitamin C foods, curd, dry fruits	20	19.09.2020	Partially recovered and discharged with weakness on 20.09.2020	Recommended Diet with Fruits—papaya, orange, Lemon, guava Vegetables—green leaf, beetroot curd and dry fruits

13	Male	O+ve	21	Vitamin C foods, vegetables, fruits, rice	—	Fever and headache from 02.09.2020	03.09.2020	Antigen test	Mild	Home Quarantine	—	Vitamin C foods, curd, dry fruits, ginger and garlic	7	11.09.2020	Absolutely normal	Recommended all vitamin foods
14	Male	O+ve	19	Highly rich in vitamin foods, carbohydrates and Zinc	—	Fever and head ache from 02.09.2020	03.09.2020	Antigen test	Mild	Home Quarantine	—	Vitamin C foods, curd, dry fruits, ginger and garlic	5	11.09.2020	Absolutely normal	Recommended All vitamin foods
15	Male	B+ve	75	Fruits, vegetables, dry fruits, wheat and brown rice	Heart patient with diabetics	Fever and cough	16.07.2020	Antigen test	Mild	Hospitalized	Severe weakness	Followed the same diet	15	PCR on 02.08.2020	Discharged with weakness on 04.08.2020	Recommended with green leafy vegetables, egg, papaya, sesame and chia seeds
16	Female	O+ve	63	Fruits, vegetables, dry fruits, wheat and brown rice	Diabetics	Fever, sour throat and cough	16.07.2020	Antigen test	Severe	—	—	—	—	PCR on 02.08.2020	Discharged with weakness on 04.08.2020	Recommended with green leafy vegetables, egg, papaya, sesame and chia seeds

laptops. All these outcomes lead to the generation of higher amount of free radicals in our body. Therefore, the antioxidants play a vital role in regularizing them by neutralizing and eliminating free radicals from bloodstream, tissues, and organs (Brambilla et al., 2008). If the free radicals are not quenched by antioxidants, it will cause damage to cells, proteins, DNA, and RNA. The adverse effects caused by free radicals were pathogenesis of diverse conditions, such as cancer, radiation damage, and accelerated aging (Lobo et al., 2010).

Fruits, vegetables, nuts, and spices are highly rich in antioxidants. Out of all fruits, the easily available Indian fruit: guava has maximum antioxidant activity whereas banana has the least activity. The most traditional Indian spices are rich in antioxidants; curcumin has antibacterial, antiviral, and antifungal activity (Narayanan et al., 2012; (Zorofchian Moghadamtousi et al., 2014). Pulses like rajma have highest antioxidant property (Carbas et al., 2020). This is mostly used by every Indian with the combination of roti in breakfast or dinner. Selenium is one of the essential trace elements present in coriander and mustard seeds that helps to protect the body from free radical damage due to its potent antioxidant activity; most commonly used in Indian dishes. One of the studies states that eating foods containing antioxidants can reduce the duration of illness and severity of symptoms, when the viral infections were observed in the form of flue or cold (Peterhans, 1997). Antioxidants present in the body may also help to reduce the illness from COVID-19, its severity and duration of infection.

33.3.3 Vitamin C

The most popular supplement is vitamin C, which protects from organs infection due to its important role in immune health (Carr and Maggini, 2017). Deficiency of this vitamin is more prone to various types of infections. The vitamin C supports the function of various immune cells and increases their ability to protect against infections. It is also necessary for cellular death which helps to keep the immune system healthy by flushing out old cells and replacing with new ones, Vitamin C also acts as a powerful antioxidant. It is accessible in large quantities through natural sources like fresh fruits and vegetables. A serving of five different fruits and vegetables together provides the vitamin C required for an individual.

The only limitation of vitamin C content in foods is cooking and storing for a long times would reduce, which can be lowered by steaming and microwaving. When fruits are cut and exposed to air vitamin C is lost by oxidation.

33.3.4 Vitamin D

This fat-soluble vitamin helps in functioning of immune system particularly for lungs. Vitamin D enhances the pathogen fighting effects of monocytes and macrophages, white blood cells that are important in immune functioning and decreases inflammation, which helps to promote immune response. It is fortunate to have plenty of sunshine based on the seasons in India but today's modern life style makes this generation deficient in vitamin D, which in turn effects immune function. In fact, low vitamin D levels are associated with increased risk of upper respiratory tract infections including influenza and allergic asthma. Review of few randomized controlled trials (RCT) confirmed that supplementing with vitamin D significantly decreases the risk of respiratory infections (Hansdottir and Monick, 2011). Few literature studies stated that vitamin D deficiency could be one of the reasons to be susceptible to COVID-19 and even increase its severity. The studies also reported that the number of patients in intensive care unit admission was reduced with supplements of vitamin D. The COVID-19 affected patients were treated with calcifediol known as 25-hydroxyvitamin D with promising results (Meltzer et al., 2020); (Castillo et al., 2020). Many positive cases of COVID-19 have been diagnosed with acute lung infections. Therefore, balancing the vitamin D is relatively important for the innate immunity.

The best source of vitamin D is UV radiation from the Sun. UV radiation levels vary depending on location, season, time of day, and environment. Based on these factors, synthesizing vitamin D on exposed skin between 10 AM and 3PM would be beneficial. Fair skinned individuals may require 20 min exposure to direct sunlight 3 to 4 times a week for the skin to make adequate vitamin D. Darker skinned individuals require 30 to 40 min exposure 3 to 4 times a week. Half an hour of exposure synthesizes 50,000 IU of cholecalciferol. Obese people require higher levels of vitamin D (Wacker and Holick, 2013); (Moan et al., 2014).

33.3.5 Vitamin A

If a person is deficient in vitamin A, both specific and non-specific protective mechanisms are impaired. Vitamin A is more significant for proper vision, growth development, protecting epithelium, and mucus integrity in the body. It is more often referred to as antiinflammation vitamin due to its vital role in enhancing immunity (Huang et al., 2018). In particular vitamin A deficiency diminishes antibody mediated responses. A study conducted by (Mawson,

2013) indicates that decreased vitamin D to vitamin A ratio is more susceptible to influenza virus infection. Higher levels of vitamin A lowers vitamin D levels and is more prone to respiratory tract infections. High levels of vitamin A over a period of time, particularly from animal sources lead to liver toxicity. Foods like liver from animal sources should be preferred in the required amounts.

33.3.6 Vitamin E

The immune function of vitamin E is nonspecific (Lee and Han, 2018). Indian traditional cooking involves mustard and sesame seed oils because of it high levels of vitamin E. Usually plants has more sources of vitamin E than animal foods. Heating oil is a common practice in cooking. The loss of vitamin while cooking entirely depends on the duration of heating, which can be minimized through different cooking methods.

33.3.7 Vitamin B6, B9 (folate), and B12

Vitamin B6 and B12 directly acts on the white blood cells (WBC) and CD4⁺ T cells. These cells are important in providing an adaptive immune response to a wide variety of pathogens. Folate restores T-cell proliferation and normal-cell cycle, decreases DNA-uracil content, and lowers CD4⁺/CD8⁺ ratio. Thus, deficiency of folic acid may affect the immune system by dropping the ability of CD8⁺ T cells to proliferate in response to activation. All the three vitamins of B are important for immunity and cellular functioning (Rail and Meydani, 2009); (Mikkelsen and Apostolopoulos, 2019). It formulates a protein interleukin-2 that helps the action of white blood cells. So deficiency of this vitamin affects the WBC.

33.3.8 Minerals: copper (Cu), iron (Fe), and zinc (Zn)

Inadequate minerals such as copper, iron, and zinc make humans more susceptible to illness by infections (Prohaska and Lukasewycz, 1990); (Sherman, 1992; Prasad, 2008). The defective antibody production in human, impaired cellular function, and respiratory illness causes due to deficiency of copper. Deficiency of copper leads to neutropenia. The WBC reduces and more likely to get infections. Iron is important for the functioning of lymphocytes, a subtype of WBC (natural killer cells) which acts in cell-mediated, T cells and B cells for developing antibodies. Iron, copper, and zinc are required for optimal innate immune function (Ward et al., 2011); (Djoko et al., 2015). Copper and iron are important minerals for nutritional immunity and develop innate immune response to fight against microbial infections (Djoko et al, 2015). The uptake of copper is incorporated into ceruloplasmin, a primary ferroxidase enzyme that is responsible for the oxidation of ferrous to ferric so that iron can be bounded by transferrin and transported throughout the body. So copper plays a major role in iron homeostasis (Arredondo and Núñez, 2005); (Gavin-Smith, 2020). Zinc helps in maintaining a healthy appetite and assists in perception of taste. Loss of taste and smell were observed recently as one of the symptoms for COVID-19. So zinc would be under top priority of immunity.

Zinc is more readily absorbed from animal sources than plant products. Seeds, meat, eggs, and dairy products are the best sources. Fruits and vegetables are fair sources. Zinc deficiency is more prevalent in many and high in those who consumes large amount of cereals, potatoes, and legumes that would interfere with the absorption of Zinc because of phytic acid. This is rarely concern among us but it is a significant problem for developing countries for those who depend on cereals or legumes. So phytate content can be decreased by soaking, sprouting, and fermentation (Arnarson, 2018). The three techniques were discussed below.

33.3.8.1 Soaking

Soaking is one of the methods to decrease phytate content. To absorb the zinc into the body while consuming cereals and legumes, it is advisable to soak them in water overnight.

33.3.8.2 Sprouting

Green grams, chick peas, bengal grams, and legumes on sprouting possess high Vitamin C and acts as a powerful stimulant for WBC to fight against infections and builds immunity. It helps in reducing phytic acid on sprouting and balances the absorption of zinc. Sprouting even enriches vitamin A which has antioxidant properties and acts a good source for immune strength.

33.3.8.3 Fermentation

This helps to generate organic acids to break down the phytate. For instance, lactic acid is generated in making curd or sour dough. The most probiotic food consumed by Indians traditionally is curd rice. It is prepared by soaking cooked plain rice in milk, adding small amount of curd and leaving whole night to get fermented. Eating it next

day is a very common practice. This method is preferred in summer seasons particularly to protect us from various infections that can boost our immunity.

33.3.9 Herbs

Lastly the most common and regular spices, also known as herbs, that are used in Indian dishes are garlic and ginger since they are a part of immune system to fight against cold and flu. No Indian cuisine is complete without garlic and ginger. Garlic exerts immune potentiating effect by stimulating natural killer cell activity (Joe Leech, 2018). Ginger possesses antioxidant properties and reduces intestinal contractions (Mashhadi et al., 2013).

Obese, diabetic, and hypertension people are more prone to COVID-19. The above mentioned foods will have a positive impact on those people. In addition to all the above requirements; adequate hydration, personal hygiene practices by using proper personal protective equipment (PPE), good exercise, and sleep are equally important.

Out of many medicinal plants from India, neem is one of the most important medicinal plants with a number of therapeutic uses including antiviral activity (Badam et al., 1999). It is a rich source of antioxidants (Trivedi et al., 2019). In India it is used to treat viral diseases like small pox and chicken pox and also used in cooking to prevent from the viruses. Neem extracts absorb the viruses and helps to prevent them from transmission. This can be used as a disinfectant to kill the COVID-19 virus or the extract can be consumed to prevent from the viruses. One of the studies shows that sodium hypochlorite is used as a disinfectant but can have toxicological effects (Public Health England, 2015). This can be replaced by neem and curcumin extracts to maintain hygienic condition in the environment. Therefore, the immune booster types in Table 33.2 promote the immune system for every individual through balanced diet recommended per day (Dasgupta and Klein, 2014); (Sarkara et al., 2015); (Srilakshmi, 2018).

TABLE 33.2 Immune booster recommendations and its available sources (Dasgupta and Klein, 2014); (Sarkara et al., 2015) and Srilakshmi, 2018).

S.No	Name of the immune booster	Recommended quantity for men/ women per day	Available sources
1.	Lysozyme	74 mg	Vegetables—cauliflower, cabbage, broccoli, turnip and radish Citrus fruits—orange and papaya Egg white Fortified cheese with lysozyme enzyme
2.	Antioxidants	500–600 mg	Fruits—guava, red grapes, pomegranate, and amla Vegetables—red cabbage, ladies finger, broad beans, raw mango, moringa leaves (drumstick), sour spinach (gongura), and mint leaves Seeds—chia, basil, coriander, and mustard Indian spices—cloves, cardamom, nutmeg, bay leaves, cumin seeds, fenugreek seeds and curcumin (turmeric) Nuts—walnuts Pulses—rajma
3.	Vitamin C	90 mg	Fruits—gooseberry, guava Citrus—lime, orange, tomato, and tomato juice Vegetables—moringa leaves, agathi (tamarind leaves), green and red peppers, and sour spinach (gongura) Sprouted green grams, chick peas, Bengal grams and legumes Chia seeds
4.	Vitamin D	15 µg or 600 IU	Sunlight exposure for 20 min 3-4 times a week for fair skin and 30-40 min for dark skin. Egg yolk, butter, and Milk Salmon fish and mushrooms
5.	Vitamin A	900/700 µg	Fortified foods—dairy products, orange juice, soya milk, and cereals. Green leaf vegetables—moringa, amaranthus, spinach

(continued)

TABLE 33.2 (Cont'd)

S.No	Name of the immune booster	Recommended quantity for men/ women per day	Available sources
6.	Vitamin E	8–10 mg	Vegetables—carrots and pumpkin Egg Sesame seed oil and millets Moringa leaves Legumes—rajma, chick peas, and soya beans Vegetables—moringa leaves, sweet potatoes, and carrots Nuts—pistachios, hazel, and peanuts Fruits—banana and water melon Seeds—sunflower seeds and sesame seeds
7.	Vitamin B6	2.0 mg	Cereals—wheat, maize, oats, barley, and millet Legumes—rajma, chick peas and soya beans Vegetables—moringa leaves, sweet potatoes, and carrots Nuts—pistachios and peanuts Fruits—banana and water melon Seeds—sunflower seeds and sesame seeds
8.	Vitamin B9	400 µg	Green leafy vegetables and broccoli Legumes and egg Citrus fruits Almonds and flax seeds
9.	Vitamin B12	2.4 µg	Cereals, barley grains, and banana Egg and milk Salmon and tuna fish Moringa leaves Yogurt and cheese
10.	Copper	900 µg	Nuts—almonds, cashew and walnuts Moringa leaves Sunflower and sesame seeds Legumes and soya beans
11.	Iron	19–20 mg/17–19 mg	Legumes—lentils, beans, and chick peas Chia, pumpkin, and sunflower seeds Nuts—cashew and almonds Amaranthus and moringa leaves
12.	Zinc	8/11 mg	Nuts—soaked almonds and cashew Meat and eggs Moringa, green peas, and spinach Pumpkin seeds and flax seeds Dairy products
13.	Garlic	600–1200 mg	—
14.	Ginger	3–4 g	—

33.4 Conclusion

Starting the day with detox drinks improves the function of liver, gut, and kidneys to get rid of toxins and makes us feel refreshed and active. The perfect choice for the detox drink is a combination of apple, carrot, and beetroot (ABC) that can be preferred from one to three days. Proteinaceous breakfast would kickstart the day by increasing the basal metabolic rate. The last meal should be completed at least 2 to 3 hours prior to sleeping. Lastly, awareness of genetics play a significant role in the diet and to focuss on foods that is local and seasonal, as adaptation of different foods while migration would influence the immune system.

Some of the studies predict that COVID-19 virus survives in alkaline environment, so it is more advisable to prefer the foods mentioned especially the citrus fruits and probiotics which are acidic. Hence, building self immunity through nutritious foods rich in lysozyme, antioxidants, vitamins, minerals and herbs help to overcome COVID-19 despite its pandemic spread.

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