

# Essential food and active Immune system combat the Novel COVID-19 Infection; A Story So Far

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## ABSTRACT

The novel respiratory viral infections are a leading cause of mortality and fatality in worldwide nations. Both childhood and old ages are vulnerable to the severity of COVID-19 infection. Early age viral infection has a long-lasting impact and may cause wheezing and asthma later in life. Unfortunately, the COVID-19 outbreak is novel and the world health agencies were not ready to combat as early as possible as there is no actual medical line or vaccine to treat and prognosis the COVID-19 infection. The functional food can support the equilibrium of body physiology and thus augments the natural guard system so-called immune system. Balanced food intake has the natural significance in the direction of host resistances against the viral and bacterial threats. In the current scenario natural body immunity is the foremost source that developed resistance against the COVID-19 outbreak. This review highlighted the overview of COVID19 and relevance functional nutrition that play an important role in managing the novel coronavirus infection while boosting the immune system.

**Keywords:** COVID-19; Identification and characterization; Role of food; immunity, Food ingredients

## INTRODUCTION

In December 2019 a novel coronavirus (Chan, 2015 #13) (Chan et al. 2015) was primarily recognized in Wuhan a city of China. The virus was found in a group of individuals who showed an anonymous type of virus-related pneumonia. Assessment for viral pneumonia was done in patients. Polymerase chain reaction (Li et al. 2020) cell cultures and whole-genome sequencing of Broncho alveolar fluid were done to rule out the presence of this novel coronavirus. Coronaviruses are recognized as a cluster of viruses which can influence both humans and animals and numerous of these viruses (Bonham et al. 2002) are thought to be an etiological factor of a common cold (Chan et al. 2013; Yin and Wunderink, 2018). The isolation of the virus was done through biological trials and recognized as a genus  $\beta$ -coronavirus. It was placed together with Middle East respiratory syndrome and severe acute respiratory syndrome (Zhu et al. 2020).

Malnutrition and infection interlinked with each other. But diet does not affect every viral infection correspondingly (Scrimshaw et al. 1968; Chandra and Kumari 1994). Several contagions (like virus-related and bacteriological diarrhea pneumonia tuberculosis measles) there is ample indication that the medical progression and results are harshly disturbed by nutrient deficiencies. Nutrition has a reasonable effect on virus-like human immunodeficiency virus influenza virus and many other viruses. Functional foods (certain nutrients) affect one or more objective responses in the body. Use as a type of antidepressant has been extensively researched over the past two years. It is well known that nutrition plays an important role in chronic diseases but recently it has been reported that data on the effect of certain nutrients or foods on the immune system are available (Hoyle and Vulevic 2008). A food is said to be functional food if it is reasonably confirmed to mark positively one or more objective functions in the human body yonder satisfactory

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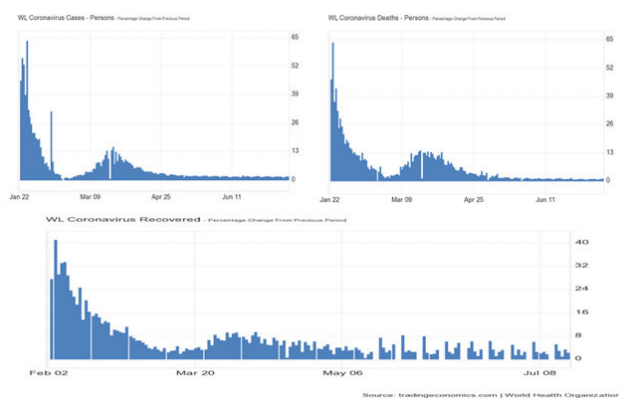
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dietary possessions in a way that is related to either one good health and better stage of healthiness or decrease threat of infection (Action 1999). It is currently recognized that nutrients insufficiency is normally related to lessen immune reactions mainly the complement system phagocyte reaction antibody attraction secretory antibody reaction cytokine creation and cell-mediated immunity (Chandra 1996; Gershwin 2012). Lack of nutrients also consequences in changed immune reaction this is detected even when the insufficiency state is comparatively unimportant. Micronutrients like vitamins A, C, E, vitamin B6 folic acid copper selenium iron and zinc have significant effects on the immune system. Obesity and Over nourishment also decrease immunity. Low birth weight infants have long-term immune-arbitrated cellular disorders that can be partially remedied by adding extra amounts of Zinc to the diet. In the older people weakened immune system can be improved by certain quantity of various micronutrients. These conclusions have significant useful and community strength significance (Chandra 2002) [1-10].

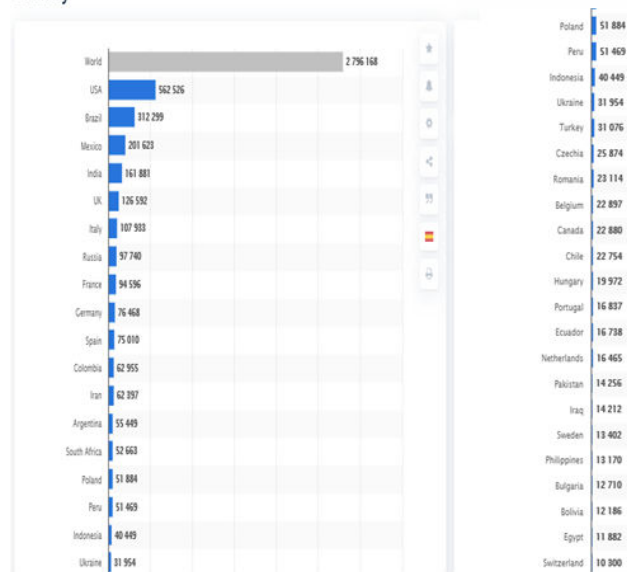
## EPIDEMIOLOGY

Currently the rate of corona infected individuals is increased (>67091) and health authorities of China stated the mortality rate of 1527 from the virus. Epicenter of this outbreak is Wuhan a city of China. Till now almost all countries of Middle East America North America Asia Africa and Europe have established cases of corona virus (Peeri et al. 2020). In 01 month of 1st identification the virus spread all over the globe which might be communicated through direct or indirect contact of adjacent people to people. It is declared by world health organization (WHO) that corona virus (COVID-19) is a community health emergency of global apprehension after 1st of February 2020 (Huang et al. 2020). It is reported that that severe acute respiratory syndrome (SARS-CoV-2) is communicable as severe acute respiratory syndrome (SARS) coronavirus and perhaps much communicable as compared to viruses of influenza [11-15]. Though the reported cases in China are decreasing while the cases are increasing in South Korea Iran Japan Italy Spain United Kingdom and United State of America (Khan et al. 2020). However, it is probable to change over the coming days or weeks are updated as shown in the Fig. 1.



**Figure 1:** Scheme represents the COVID-19 infection highlights in the world

**Number of novel coronavirus (COVID-19) deaths worldwide as of March 29, 2021, by country**



**Figure 2:** Worldwide death rate by COVID-19 in March29, 2021country wise

## NOVEL COVID-19 IDENTIFICATION AND CHARACTERIZATION

An electron microscopic investigation corona viruses (CoVs) are +ve stranded ribose nucleic acid (Bonham et al. 2002) viruses having a shape like crown. Orthocoronavirinae is a subfamily of Coronaviridae family that categorizes into 04 genera of corona viruses (CoVs) i. e.  $\alpha$   $\beta$  gamma and delta coronavirus. Moreover  $\beta$ -CoV is divided into 05 sub-lineages (Chan et al. 2013). Generally, estimation advocates that 02 % of the populace is strong carriers of a coronavirus (CoV) which are accountable for ~ 05-10 % of severe respirational contagions (Chan et al.2019). Upper respiratory infections in immunocompetent individuals is caused due to common human coronaviruses (HCoV- 229E and HCoV-NL63 [ $\alpha$ -CoVs] and HCoV- OC43 and HCoV-HKU1 ( $\beta$ -CoVs of A lineage). Lower respiratory tract infections might cause in immune-compromised and elder people. MERS-CoV ( $\beta$ -CoVs of the B and C lineage) SARS-CoV-2 and SARS-CoV are the additional human coronaviruses (CoVs) respectively. They are capable in causing epidemics along with mutable medical sternness including extra-respiratory and respiratory infestations. Regarding MERS and SARS coronaviruses the rate of deaths is >10 and 35% respectively. SARS-CoV-2 has an elliptic/ round and frequently pleomorphic arrangement having a thickness of ~ 60-140nm. It is also sensitive to ultraviolet rays and heat like other coronaviruses. Additionally, chloroform peroxyacetic acid chlorine-containing disinfectants ethanol and ether (75%) are proved effective in inactivating these viruses. The genome of new human coronavirus (HCoV) that was secluded from a pneumonia patient from Wuhan had 89 % nucleotides with SARS bats like CoVZXC21 and 82 % human SARS-CoV. SARS-CoV-2 is a single-stranded ribose nucleic acid genome having 29891 nucleotides programming for 9860 amino acids. While the

origin is not wholly understood. It is suggested by these genomic analyses the SARS-CoV-2 is maybe evolved from a bat's strain. However, the potential of mammalian reinforcement for bats among humans and bats is not yet known. Since mutations in primary strain might directly activate the virus on humans there is no certainty that this mediator exists [16-20].

## MODE OF TRANSMISSION AND ACTION OF COVID-19

### Transmission

Since the 1st case of CoVID-19 was in direct contact with the wholesale market of sea-food of Wuhan. Animal to human communication is a key mechanism. Though the subsequent cases are not relevant to this mechanism of exposure. Consequently, it is concluded the virus might also be communicated from individual to individual and people with symptoms are most common source of transmission of COVID-19. The probability of communication before symptoms appear is rare although it is not excluded. In addition, there are propositions that asymptomatic people might communicate the virus. Data suggests that the utilization of isolates is the best way to prevent this outbreak. Like additional pathogens of respiratory system (nasal viruses and influenza) the communication is thought to occur through sneezes and coughs. Aerosol injection is also possible in cases of prolonged exposure to high aerosol concentrations in confined spaces. Analyzing SARS-CoV-2 expansion data in China it seems that the close relational connection is necessary. This outbreak is mainly limited to close contacts healthcare professionals and family members. According to data from the earliest cases in Wuhan and surveys conducted by the Chinese CDC and local CDC the incubation period owing to time might be among 03 and 07 days and up to 02 weeks. The longest time to infection until the appearance of symptoms was 12.5 days (95% CI 9.2-18) (Li et al. 2020). The data also showed that the new pandemic doubles every 07 days while the basic reproductive number ( $R_0 - R = 0$ ) is 2.2. In other words, on an average each patient infects an additional 2.2 people. Notably the  $R_0$  estimate of the SARS-CoV pandemic in 2002- 2003 was  $\sim 03$  (Bauch et al. 2005). It should be highlighted; the information is the result of the 1st reports. Consequently, the further investigations are required to comprehend the mechanism of transmission incubation period clinical course and duration of infection. Similarly, SARS transmission occurs during people to people contact through sneezing or coughing respiratory droplets although not as much as the current COVID-19 outbreak. Furthermore, the fluid transportation fecal transfer and handling of animals (killing selling or procuring wild animals) are not more common methods of communication [21-25].

### Action

Coronaviruses (CoV) are RNA +ve viruses having a nucleocapsid core. The pathogenic mechanisms of SARS-CoV-2 its genome and viral structure must be considered. In coronaviruses (CoV) the gene structure of ssRNA +ve is  $\sim 30$  kb in length - the largest known RNA virus - and consists of a 05 %

spiral and 3'-poly-A tail structure. Starting with viral RNA the synthesis of 01 pr/ 1ab polyprotein (pp1a/ pp1ab) is performed in the host. Transcription is done via a transcription-transcription complex (RCT) organized in membrane vesicles and through the synthesis of endogenous RNA chains (sgRNA). The transcription termination occurs in transcriptional regulatory sequences located between frames called open reading frames (ORFs) that act as sub-gen mRNA production models. Atypical genome of coronaviruses (CoV) might comprise at least 06 ORF. Different from ORF1a and ORF1b other structural protein proteins including spines plastic films nucleocapsid proteins and protein side chains are encoded for structural proteins. Coronaviruses (CoV) have definite accessory and structural proteins that are translated by specific sgRNAs (Perlman and Netland, 2009). The viral mechanisms and pathophysiological of coronaviruses (CoV) and therefore SARS-CoV-2 are linked to the function of nsps and structural proteins. For example, research has highlighted that nsp can block a host's innate immune response (Lei et al. 2018). Among the functions of structural proteins, the envelope plays an important role in the pathogenicity of the virus because they cause excretion of the virus (Song et al. 2018). In SARS-CoV-2 S2 subunit containing synthetic peptides transfer domain and cytoplasmic domain is highly conserved. Therefore, it might be beleaguered for antiviral compounds (against S2). In contrast the spike in receptor-binding domains provided only 40% of amino acid identification with other SARS-CoVs. Other structural elements that need to be focused on are ORF3b which do not have similarities with SARS-CoV and proteins that are not secreted (encoded by ORF8) are structurally different from SARS-CoV samples. At global gene banks like GenBank the researchers have issued several sequences of Sars-CoV-2 gene. This gene map is very important and allows researchers to track plants that generate viral genes and most importantly identify other strains with mutations. According to recent research the spike which could occur in late November 2019 makes people jump. Angeletti and colleagues compared the SARS-Cov-2 gene sequence with the SARS-CoV sequence. The topic of viral mutations is important to explain the recurrence of possible diseases (Angeletti et al. 2019). Further investigation is required to identify the structural properties of SARS-COV-2 as pathogenic mechanisms. For i.e. compared with SARS preliminary clinical data showed less relevant respiratory although definitive clinical information could be drawn due to the lack of extensive data. The pathogenesis of pneumonia is particularly complex. Clinical research should provide many aspects that underlie specific clinical manifestations of the disease. The protagonist of this storm is Interleukin 6 (IL-6). The IL-6 is produced by activated white blood cells and works on many cells and tissues. The software can promote the differentiation of B lymphocytes stimulating the growth of some types of cells and inhibiting the growth of others. It also stimulates the production of acute phase proteins and plays a significant role in central nervous system heat measurement and bone conservation. Although the main role of IL-6 is anti-inflammatory. In turn IL-6 increases in inflammatory diseases infections autoimmune disorders cardiovascular diseases and certain types of cancer. The disease also plays a role in the pathogenesis of cytokine excretion syndrome (CRS) an acute

systemic inflammatory syndrome characterized by organ dysfunction and fever [26].

## SIGNS AND SYMPTOMS

The scientific spectrum of COVID-19 diverges from asymptomatic forms to clinical situations necessitating intensive care unit (ICU) and mechanical ventilation with respiratory failure. Multi-organ systemic presentation of multi-organ syndrome (MODS) septic shock and sepsis. In one of the 1st reports of the disease Huang et al. (2020) disclosed that the patient number 41 had shortness of breath dry cough weakness and fever. Computed tomography (Action) of chest in all the cases showed pneumonia with uncharacteristic conclusions. The ~1/3rd of them i.e.13 32% are obliged to care from intensive care unit (ICU) care and there are 06 (15%) demises (Gleeson, 2013) [27].

## POSSIBLE PREVENTION AGAINST THE COVID-19 INFECTION

### Key message from World Health Organization (WHO)

The Strategies of prevention emphasis on strict control and patient isolation including appropriate measures should take when diagnosing and clinical care for infected patients. The precautions should be taken dripping contact and exposure to air when sampling and avoiding sputum induction. Avoid close contact with people with acute respiratory infections. Wash your hands often especially after encountering an infected person or their environment. Avoid vulnerable contact with farms or wildlife. People who have symptoms of an acute airway infection should maintain a distance cover their coughs or sneezes with disposable tissues or disposable clothing and wash their hands. Strengthening in the medical emergency department apply accurate medical measures to prevent and control infections. People at risk of immunity should avoid public gatherings. A best and most significant resolution for congested public is to wash their hands frequently and use hand sanitizers and can avoid contact with the face and mouth after exposure to an infected environment. Health care workers who care for an infected person should use exposure and air precautions to use PPE such as FFP3 or N95 respirators eye protection clothing and gloves to prevent the spread of germs. Temporarily scientific research on the expansion of chiropractic vaccines is developing. In recent days China has announced the 1st animal experiment and researchers at the University of Queensland in Australia have announced that they will switch to animal experiments after a study of 03 in-vitro week. In addition, in the United States the National Institute of Allergy and Infectious Diseases (NIAID) has announced a pilot phase 1 for the new coronavirus vaccine in Washington states. Apart from that keep yourself active and healthy while following some key steps as shown in Fig. 3.[28].

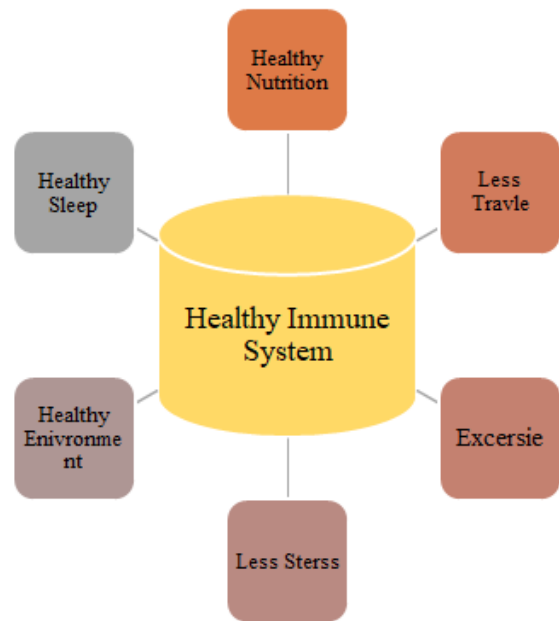


Figure3: The key steps regulating healthy immune system.

### Maintaining an Active Immune System

The adequate intake of energy protein vitamins and minerals is important for the maintenance of the natural defense system of body. Deficient consumption of micronutrients like Zn Fe Ca Mn Se Cu as well as vitamin A C D E B6 B12 and folic acid causes a reduction in the immune system and cause infections in the human body [29].

## ROLE OF FOODS IN COVID-19 OUTBREAK

In order to prevent the body from diverse infections immune system plays a dynamic role. In our daily life there are many factors that are immune suppressants. Age and many additional factors are involved in the proper functioning of the immune system. The influence of foreign pathological agents is increased in T lymphocytes compared to antigen-presenting cells (B cells). It happens due to thymus involution that is virtually complete at 60 years of age. The dependency of the host is then fixed upon the pool of T cells engendered in later life. The T cell repertoire faces alteration by the elimination of T cells clonal expansion and continuous Replacement of CD45RA+ (naive cells) with CD45RA (memory and T cell receptors) is developed. Meanwhile the accumulation is ceased due to signal transduction of T cells. An abridged competence of T cell effector and reduced clonal expansion functions like cytotoxicity y (B cell help) occurs due to alterations in T cell (age-related). In this way a condensed immunological memory and decreased antibody production are resulted. Aging alterations in the immune system signify a lenient issue for a recurrent incidence and sternness of illness. Therefore, a proper immunization is considered mandatory for an effectual defense of ageing people25. In older age the function of the immune system declines. (Grubeck-Loebenstein 1997). In older age the function



of immune system declines. The age-dependent inherent weakening of immune receptiveness is the primary immunological alteration in elder age. Diseases and numerous ecological influences together with physical activity diet and drug intake are the secondary immunological vicissitudes (Wick and Grubeck-Loebenstien 1997). In order to attain a the best and vigorous health it is highly recommended to eat in the right way. Fresh fruits and vegetables are the best foods that might be consumed to boost immune system (Table 1) [30].

**Table 1:** Functional foods and its link to immune system

Functional Food	Available Nutrients	Role in immune system
Cheese and whole milk are nutritional provider of retinol. Orange-colored vegetables and fruits and gloomy green flourishing root vegetable are nutritional provider of carotenoids.	Vitamin A	Supports T-cells (a kind of white plasma cell that assist in recognizing viruses)
Fortified mealtime cereals Oleaginous fish eggs fortified dairy foodstuffs and fortified meals.	Vitamin D	Its insufficiency results in abrupt immune reaction
Red meat dried fruits pulses Offal seeds nuts and beans fish (like mussels' cockles and preserved sardines) whole meal bread and quinoa	Iron	Supports to sustain the condition of cell of body immunity
Seeds and Nuts (for example cashews sunflower kernels and Brazil nuts) fish and shellfish offal poultry and eggs.	Selenium	Beneficial in creating immune cells and can support to reinforce reaction to contagion.
Certain root vegetable and fruit like green pepper avocado and banana fish poultry egg yolk yeast abstract soya beans sesame seeds and fortified mealtime cereals	Vitamin B6	Useful in production of new immune cells supports immune cells to interconnect and aid in functioning of antibodies
Seeds (pine nuts and pumpkin seeds) some shellfish (including mussels' crab and cockles) Meat poultry cheese nuts and wholegrain banquet	Zinc	Support in manufacturing of new cells of body immunity aid in growth of 'natural murderer cells' that supports message among immunity cells

cereals seeded breads and wholegrain.		and assist to protect from viruses
Cheese Meat fortified yeast extract fish fortified breakfast cereals shellfish milk and eggs	Vitamin B12	Aids to generate new immunity cells.
Citrus fruits strawberries tomatoes peppers blackcurrants papaya kiwi and green vegetables	Vitamin C	Supports to regulate the outer layer of body "skin" that is external resistant to diseases supports immunity cells function again infection and assist to purify damage cell of immune system from the place of contagion
Bread pulses avocado nuts seeds meat shellfish dried fruit breakfast cereals rice quinoa and fish	Copper	Supports to provide energy and defend immune cells

## Citrus Fruits and the Immune System

Antioxidant activity of citrus indicates an ability of a biologically active compound to maintain the structure and function of cells by inhibiting lipid peroxidation efficiently clearing free radicals and averting an additional oxidative damage (Bravo 1998). These fruits are enriched with advantageous phytochemicals minerals vitamins coumarins flavonoids limonoids pectin's carotenoids and further compounds. Consumption of these foods is beneficial because these fruits have anti-inflammatory anti-mutagenicity anti-oxidant anti-aging and anti-carcinogenic possessions (Rajendran et al. 2014; Ke et al. 2015; Zhang et al. 2015). Citrus fruits have more the 170 antioxidants. Six of the vitamins are found in Citrus fruits counting vitamin A B1 B2 C E and B3 (Zou et al. 2015). Vitamin C (ascorbic acid) is a leading nutrient present in citrus fruits (Xingqian 2005). Ascorbic acid is considered as an ordinary free radical scavenger that has a potential to efficiently scavenge a diverse species of reactive oxygen species (ROS) and emit semi dehydro-ascorbic acid clearing 102 and reducing sulfur radicals (Amitava and Kimberly 2014). Ascorbic acid is thought to upsurge the production of leucocytes which is helpful in fighting against infections. Because human body does not produce or store it you need ascorbic acid to stay healthy. Almost all citrus fruits have a lot of vitamin C and by choosing many of them it's easy to add to any meal [31].

## Bell Pepper and Immune System

In South and Central America numerous types of bell pepper have been cultured (Padrón et al. 2015). A variety of nutrients like Proteins Minerals (phosphorus iron potassium and calcium) vitamins (vitamin A vitamin B and vitamin C) Carbohydrates and fats are present in bell pepper

(Nadeem et al. 2011). In the body Vitamin C plays a significant role as immune booster's cholesterol regulator fat carrier and collagen production (Pacier and Martirosyan 2015). The potency of vitamin C demonstrates immune possessions as a potential antiseptic and antiviral nutrient. Vitamin C is a powerful reducing agent (redox reaction) by donating electrons to molecules. Due to this redox proficiency Vitamin C role as an enzyme cofactor and antioxidant. Vitamin C present in minor quantity in plasma act as a non-enzymatic antioxidant that provide shield to nucleic acids (DNA and RNA) carbohydrates proteins and lipids against reactive oxygen species (ROS) and free radicals that are produced as by-products from ordinary active immune cells metabolic activities and risk of toxins and contamination. Its oxidized arrangements Vitamin C are also capable to participate in redox reprocessing; for instance, vitamin C can rebuild the vitamin E (Carr and Frei 1999; Bruno et al. 2006). Nutritional value per 100(g) of bell pepper is illustrated in Table 2 [32].

**Table 2:** Nutritional value per 100(g) of bell pepper

Food ingredients	Amount/Unit	Food ingredients	Amount/Unit
Energy	24.00kcal	Vitamin C total ascorbic acid	97.00mg
Water	93.30g	Selenium Se	0.000µg
Protein	0.910g	Thiamin	0.056mg
Total lipid (fat)	0.220g	Riboflavin	0.048mg
Carbohydrate by difference	5.130g	Niacin	0.655mg
Fiber total dietary	1.800g	Vitamin B-6	0.247mg
Sugars total including NLEA	3.030g	Folate total	23.00µg
Calcium Ca	9.000mg	Folic acid	0.000µg
Iron Fe	0.370mg	Folate food	23.00µg
Magnesium Mg	11.00 mg	Folate DFE	23.00 µg
Phosphorus P	22.00mg	Choline total	5.500mg
Potassium K	188.0mg	Vitamin B-12	0.000µg
Sodium Na	3.000mg	Vitamin B-12 added	0.000µg
Zinc Zn	0.170mg	Vitamin A RAE	67.00µg
Copper Cu	0.049mg	Retinol	0 µg

\*USDA Nutrients Data Base

## Role of Fresh Barley and Broccoli in Immune System

Barley and broccoli both are selenium enriched food. Developed and inborn immune systems are affected by Selenium. Selenium shows a significant involvement in antioxidant activities and redox management. Selenium is vital nutrient for suspect person with Acquired immunodeficiency syndrome (AIDS). It also defends the body from the harmful possessions of the cytomegalovirus virus. Selenium collegial influence with the antioxidant glutathione describes its defending possessions by eliminating the more harmful radicals formed throughout oxidative stress (Alpert 2017). Viruses are undergone to transmutations to adapt more virulent forms and ruins antibody formation when there is Selenium deficiency in the body. Supplementation stabilizes age-linked weakening in immune reactions (Maggini et al. 2008). Antioxidant and Selenium inclusive presence in the body influence the person threat for disease from certain viruses (Keen et al. 2004). Nutritional value per 100(g) of barley and broccoli is presented in Table 3 [33].

**Table 3:** Nutritional value per 100(g) of Barley and Broccoli

Barley		Broccoli	
Nutrients	Amount/Unit	Nutrients	Amount/Unit
Energy	354.0/ Kcal	Energy	34.0/Kcal
Iron Fe	2.250/ Mg	Iron Fe	0.73/Mg
Calcium Ca	42.00/ Mg	Calcium Ca	41.0/Mg
Sodium Na	0.000/ Mg	Sodium Na	54.0/Mg
Vitamin C total ascorbic acid	0.000/ Mg	Vitamin C total ascorbic acid	89.2/Mg
Cholesterol	0.000/ Mg	Cholesterol	0.00/Mg
Total lipid (fat)	1.0400/ g	Total lipid (fat)	0.340/g
Protein	10.420/ g	Protein	2.700/g
Fiber total dietary	14.600/ g	Fiber total dietary	2.000/g
Carbohydrate by difference	77.080/ g	Carbohydrate by difference	5.410/g
Sugars total including NLEA	0.0000/ g	Sugars total including NLEA	1.350/g
Fatty acids total trans	0.0000/ g	Fatty acids total trans	0.000/g
Vitamin A IU	0.000/ IU	Vitamin A IU	203/IU

Potassium K	281.0/ Mg
(USDA Nutrients Data Base)	

## Fresh Carrots and Sweet Potatoes

The suitable amount of Vitamin A is present in carrots and sweet potatoes. Fat soluble vitamin the retinol shows a key role in the immune system. Particularly Retinol helps in managing the natural and cellular immunity and regulates the response of humoral antibodies (Alpert, 2017). Vitamin A also helps to maintain the mucous layer and skin the principal line that prevent against viruses as an anti-carcinogenesis increase resistance to morbidity and boost white blood cell function (Semba 1999). Vitamin A is very helpful in decreasing the chance of diseases and mortality from infectious viruses especially children (Maggini et al. 2008). Nutritional value per 100(g) of carrots and potatoes is presented in Table 4.

**Table 4:** Nutritional value per 100(g) of carrots and potatoes

Carrots		Potatoes	
Nutrients	Amount/Unit	Nutrients	Amount/Unit
Energy	38.0/Kcal	Energy	85.00/Kcal
Calcium Ca	26.0/Mg	Calcium Ca	30.00/Mg
Iron Fe	0.51/Mg	Iron Fe	0.850/Mg
Potassium K	321/Mg	Potassium K	337.0/Mg
Sodium Na	77.0/Mg	Sodium Na	55.00/Mg
Cholesterol	0.00/Mg	Cholesterol	0.000/Mg
Fatty acids total trans	0.000/g	Fatty acids total trans	0.0000/g
Fatty acids total saturated	0.000/g	Fatty acids total saturated	0.0000/g
Protein	1.280/g	Protein	1.6900/g
Total lipid (fat)	0.000/g	Total lipid (fat)	0.0000/g
Carbohydrate by difference	8.970/g	Carbohydrate by difference	20.340/g
Fiber dietary total	2.600/g	Fiber dietary total	3.4000/g
Sugars including NLEA total	6.410/g	Sugars including NLEA total	4.2400/g
Vitamin (D2+D3)	D 0.00/IU	Vitamin (D2+D3)	D 0.000/IU

International Units	International Units
*(USDA Nutrients Data Base)	

## Dry Fruits and Immune System

Almonds and peanuts contain prodigious amount of vitamin E. Vitamin E is an immune booster nutrient. Commonly In aged adult there is deficiency of vitamin E. Approximately 2/3 aged adult's population faced the problem of low quantity of vitamin E in body. According to the Registered Dietary Association (RDA) Laboratory quantities of vitamin E levels are estimated in the inadequacy/deficiency level if lesser than 40 IU (International Units). Consumptions of vitamin E between 400 and 800 IU have lessened the chances of diseases remarkably in elder adults. Immune responses are improved and boosts by the utilization of Vitamin E (T-helper (Th)). Supplementation of aged persons increases the potential of whole immune function (Broadhurst et al. 2002). Nutritional value per 100(g) of almonds and peanuts is demonstrated in Table 5.

**Table 5:** Nutritional value per 100(g) of almonds and peanuts

Almond		Peanut	
Nutrients	Amount/Unit	Nutrients	Amount/Unit
Energy	536.0/Kcal	Energy	6560/Kcal
Calcium Ca	143.0/Mg	Calcium Ca	0.00/Mg
Sodium Na	357.0/Mg	Sodium Na	1600/Mg
Vitamin C total ascorbic acid	0.000/Mg	Vitamin C total ascorbic acid	0.00/Mg
Cholesterol	0.000/Mg	Cholesterol	0.00Mg
Fatty acids total saturated	10.710/g	Fatty acids total saturated	9.380/g
Fatty acids total trans	0.0000/g	Fatty acids total trans	0.000/g
Carbohydrate by difference	39.290/g	Carbohydrate by difference	18.75/g
Total lipid (fat)	42.860/g	Total lipid (fat)	56.25/g
Protein	14.290/g	Protein	25.00/g
Fiber dietary total	7.1000/g	Fiber dietary total	6.200/g
Sugars including NLEA total	25.000/g	Sugars including NLEA total	6.250/g
Iron Fe	3.860Mg	Iron Fe	2.250/g
Vitamin A IU	0.000/IU	Vitamin A IU	0.00/IU

\*(USDA Nutrients Data Base)

## Enrich Sources of Vitamin B Complex and Immune System

Vitamin B6 is present in chicken breast Tuna baked potatoes chickpeas and bananas. There is a lack of vitamin B6 in young and teenage girls due to the consumption of processed food excessive sugar intake and weight-reduction plan. Vitamin B6 insufficiency worsens the mitogenic reactions of lymphocytes in aged person which is inversely related to nutritional consumption of vitamin B6. Lymphocyte development and maturation weakens due to the scarcity of vitamin B6. It also effects the formation of antibodies decrease in the mass of the thymus gland and activities of T-cell (Rekha and Vijayalakshmi 2010).

Besides green leafy vegetables the natural structure of vitamin B is Folate also present in diets such as peas and beans. The artificial form of folate is folic acid. Foods that are enriched with folic acids comprise some cereals other whole grains pastas and breads. Water-soluble vitamin Folic acid act as key component in bone marrow formation cell creation in blood making structures and cell subdivision. The manufacturing of energy in the body is also a major function of folic acid. Tetrahydro is a main component of protein production and nucleic acid that obtained as a result of the conversion of folic acid in the body. Vitamin B12 also shows significant influence in cell development and cell subdivision in the working of the immune system. White blood cells cannot be developed and reproduced when there is scarcity of Vitamin B12. Healthy older people with impaired serum vitamin B12 concentrations are impaired in response to the pneumococcal polysaccharide vaccine. Vitamins B complex includes vitamin B6 and B12 and folic acid are affecting the immune responses by participation in protein and nucleic acid synthesis. Maintain the immune response of Th1 natural immunity (activity of natural lethal cells (folate folate)) and act as an immune system modulator for cellular immunity especially cytotoxic cells (NK CD8 + T). Effects on lymphocytes (vitamin B12) (Maggini et al. 2018).

## Trace Elements and Immune System

### Zinc (Zn) Enriched Food

Zinc is virus inhibiting mineral that present in foods such as chickpeas yogurt lean meats processed beans oyster's poultry crab and wheat. Zinc is consideration for immunological possessions and appears too necessary for intensively multiplying cells especially in immune system. Zinc also affects the activities of both developed and inborn immune system. Zinc improves the regulation of mucosal sheath reliability and outer protective layer. Zinc ions in unchain structure has a nonstop antiviral influence on rhinovirus duplication. The quantity of cytotoxic CD8+T cells antibody reactions and cellular mechanisms of inherent immunity enhanced by Zinc intake (Salampessy 2010).

## Copper Enriched Foods

Liver is enriched with copper. The 10.3 mg of copper is obtained through the utilization of one piece (67g) of calf liver an enormous 1144% of the reference daily intake (RDI). The substantial amounts of copper also obtain from numerous green vegetation. Copper is a necessary minor element for human and animal body. Copper is required only in minute quantity almost 100 mg Cu is present in human body. It's highly suggested to intake 900 mcg amount of copper through diet on daily basis. As a transition element it is the causative agent of many Redox (oxidation-reduction) enzymes. Copper plays a significant role in the metabolic rate of iron. Copper is also necessary for numerous biotic developments like neuropeptide production immune function and antioxidant defense (Bonham et al. 2002). For normal activities of immune responses body needs a specific quantity of Copper. The bulk amount of copper is found in shape of cupric ( $\text{Cu}^{2+}$ ) in the body. It can simply take and give electrons that enlighten its duty in clearing the body from free radical and redox activities (Higdon 2009). In light to medium insufficiency of Copper there is a decrease in the multiplication of T and interleukin 2 cells. The capability of neutrophils peripheral blood to eradicate ingested microorganisms and produce superoxide anion is decreased due to decline in the quantity of neutrophils peripheral blood in the body of an individual in acute insufficiency of Copper (Percival 1998). To protect the normal functioning of body against reactive oxygen species (ROS) Portion of Cu/Zn-superoxide dismutase is a leading enzyme. Copper is responsible for the inflammatory reaction and regulation of intracellular antioxidant equilibrium. The cells function boost by suitable consumption of Copper. Both excess and lack in quantity of Copper affects the immune response (Wintergerst et al. 2007).

## HOW NUTRITION SUPPORTS THE IMMUNITY OF OLD AGE FOLKS?

Nutrition is an important health factor. Variations in age-associated immune insufficiency contain reduced anticholin 2 creation reduced sensitivity declined blood movement reduced lymphocyte response to antigens and mitogenesis and enlarged antibody titers after medication and comprises reduction. In various aged persons the immunity responses are incompetent to protect itself against viruses' malicious cells and other harmful factors (Salo et al. 2014). Elderly is related with a decrease immune reaction in majority of people but not in all aged person. The proliferation of antibodies in the elderly indicates that immunodeficiency also increases. Older people are prone to nutrient deficiencies for a variety of reasons. According to assessments conducted in Canada Europe India and the United States it's predictable that around 35% of individuals who are 50 years old have a noteworthy insufficiency of one or more trace elements and vitamins (Baughman et al. 2001). Essential nutrients deficiencies in apparent healthy elderly is illustrated in Table 6.

**Table 6:** Essential nutrients deficiencies in apparent healthy elderly



Nutrients	Deficiency (%)	Nutrients	Deficiency (%)
Vitamin A	8.0	Vitamin C	16
Beta-carotene	11	Vitamin D	12
Vitamin B1	3.0	Vitamin E	10
Vitamin B2	4.0	Iron	14
Vitamin B6	7.0	Zinc	19
Folic acid	8.0	Selenium	7.0

## CONCLUSION AND FUTURE ASPECTS

Worldwide death rates escalate over time. The virus has expanded around the globe since the COVID-19 outbreak in Wuhan China. People with weakened immune systems and old ages populations are at greater risk of ease developing this coronavirus (COVID-19) infection. There is presently no precise antiviral drug or vaccine that possess therapeutic role against COVID-19. Worldwide health agencies and biological sciences institutional corporations are working around the clock to develop the vaccine. Meanwhile there are no appropriate handlings measurements to deal the burning coronavirus infection. All health professionals and electronic media need to guide the people about key food diets that boost the immune system during the evolving health emergency period and thus prevent the infection. Due to the gradual increase in the ratio and the absolute number of people over the age of fifty more attention has been paid to their nutritional requirements. The diseases rate is higher in aged persons and each case continues for longer times than younger ones. Due to these numerous efforts have been prepared to study the immune system at various stages of life and to study methods to enhance immunity through nutritional intake and food supplements.

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