Covid-19: Information, Transference, Properties of Human Coronaviruses, and Enhancing Immunity by Dietary Recommendations

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Abstract

In Wuhan City, China was found a new type of viral infection could be a novel CoV strain (2019-nCoV) which as an acute respiratory syndrome CoV-2 (SARS-CoV-2) and formerly, severe acute respiratory syndrome (SARS). All these emerging infectious diseases are caused great damage to general health.New Coronavirus has diffused very quickly at the world and the World Health Organization has declared it a pandemic. It usually affects people who are immunocompromised. Immunodeficiency often comes from nutritional deficiency and this makes viruses stronger. Therefore, this review focused on the identification of the SARS-CoV-2 virus, its transmission and spread, and the history of Coronavirus. In addition, how to boost immunity by learn about nutrition recommendations and healthy diets during the COVID-19 pandemic.

Key words: *2019-nCoV; SARS-CoV-2; COVID-19; Nutrition; immunity; dietary recommendations.*

Introduction

Coronaviruses (CoVs) are widely present that symptoms began with the development of severe acute respiratory syndrome (SARS) and MERS-CoV in 2002 and 2012, respectively. Currently, Coronavirus Syndrome (Covid-19) appeared Coronavirus Syndrome (Covid-19) appeared in delayed 2019, which poses a health danger due to the continuing epidemic in the world [(1).]

Health workers are making efforts to control the new Coronavirus that was detected in Wuhan, China, in December 2019. Whilst, in 2020, the World Health Organization (WHO) started the disease is "COVID-19" may be due to SARS-CoV-2, and it is concerning to the southern Chinese human seafood market in Wuhan[(2).] Coronavirus (CoVs) belong to the family *Coronaviridae* which producing diseases like SARS, MERS, and also current, COVID-19 [(3),] however, this novel virus is genetically distinct. Until 2020, Coronavirus (CoVs) have caused in great mortality and also keep connected with upper-respiratory diseases [(4).]

Genomic examination showed that SARS-CoV-2 is relatively concerning SARS-like bat viruses and its transmission to humans is not known. However, few large-scale antiviral drugs have been evaluated against COVID-19 in clinical trials, which may lead to clinical recovery [(5)].

What is the virus (SARS-CoV-2)

Coronaviruses are RNA viruses had contained natural hosts and influence multiple systems [(6).] Coronaviruses can reason clinical illness to great severe respiratory diseases such as SARS and MERS [(7).] The SARS-CoV-2 has caused a comprehensive to the worldwide population; in addition, the WHO announced an official name for this disease as COVID-19 [(8).]

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The SARS-CoV-2 brings under the group2B coronavirus [2]. The genome sequences of SARS-CoV-2 shared by 79.5% sequence similarity to that of SARS-CoV [9].

Coronaviruses encode four main proteins, namely Spike glycoprotein (S), Membrane protein (M), Envelope glycoprotein (E), and Nucleocapsid protein (N), in Figure (1) [10].

Transmission, spread, and emergence of SARS-CoV-2

The new coronavirus was identified during four weeks (28 days) from beginning, compared to the time for SARS virus identification (125 days) in Foshan, China [11]. From analyzes, it was found that the primary infection among the infected was common in a seafood market in Wuhan, China (Fig. 2). These restaurants are serving various kinds of overland animals to human consumption, and this may be due to the transmission of infection from animal to human (zoonotic) [12]. Therefore, the SARS-CoV-2 is could be infected from an animal to human and also human-to-human (Fig. 2), and also the potential of food-carried transportation for happening a connected potential [1]. In addition, possible and predictable ways connected with the transmission, similarly respiratory viruses; by immediately relate polluted hands, and surfaces (Fig. 2). It could know if blood transfusion and organ transplantation [13], and also perinatal may be possible for SARS-CoV-2 transmission (Fig. 2).

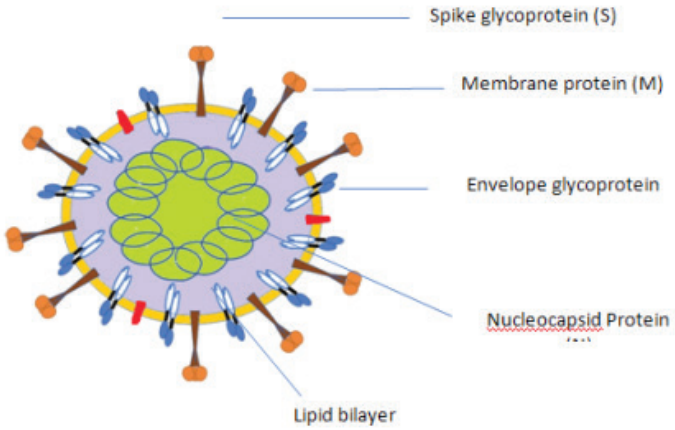

Figure (1): SARS-CoV-2 virus structure [10].

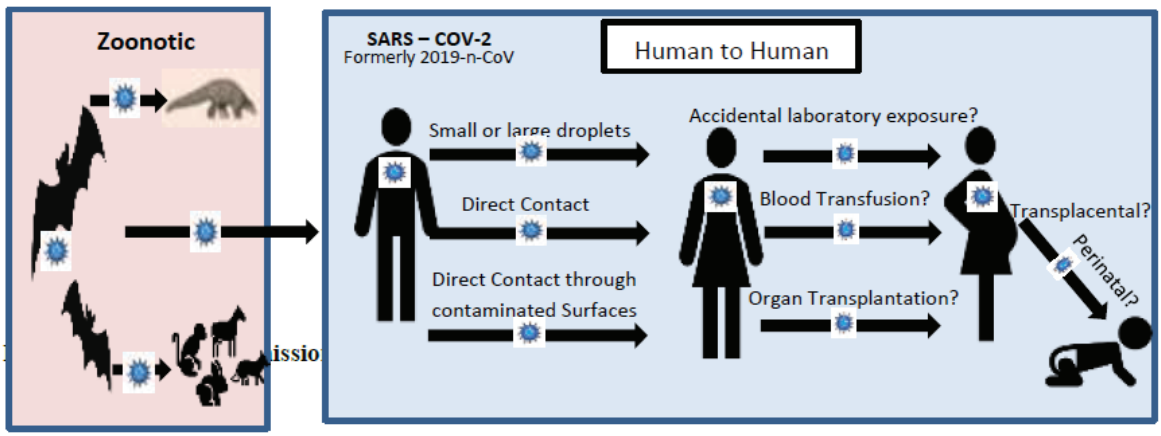

Fig (2): Potential transmission routes for SARS-CoV-2 [1]

Phylogenetic estimated for whole-genome sequences of SARS-CoV-2 found that CoVs of the bat origin were pointed to during 2018 in China [14]. It was pointed to that SARS-CoV-2 have to utilize ACE-2 as an entry receptor whilst showing the same receptor-binding domain as SARS-CoV [15]. Therefore more countries were recommendations for their people when traveling to China [16]. In the past, the efficiency in transmission of SARS-CoV-2 for human-to-human is less, which may be due to the health workers were less influenced by deadly coronaviruses [1]. It could be due to the super infecting for transmission of SARS and MERS [17]. About half of the MERS-CoV situations pointed out in Saudi Arabia had occurred during contact with infected-asymptomatic or with symptomatic [18]. The SARS and coronaviruses can affect the lower respiratory system with average symptoms [19].

Coronaviruses (CoV) in humans – SARS, MERS, AND COVID-19

WHO [8] suggested that the various SARS and MERS infection COVID-19 can be based on the human-to-human transmission that happens during immediate relate. Modern research showed that the aerosol transmission of SARS-CoV-2 is feasible may be due to the virus being able to stay viable in aerosols for more hours and on surface all-day [20].

Peiris *et al.* [21] definition SARS as a viral respiratory illness that may be due to the animal coronavirus produced from the seafood in China after becoming suitable to the human host, and it can be transmitted among humans. **WHO** [22] found that the SARS setting in the year 2002-03 has identified total deaths 9.6%, the coronaviruses have exhaustively influenced China [23]. Thereby the dead rate coronaviruses are less than SARS-CoV, there occurs a heavy worry related may be due to its epidemiological likeness to influenza viruses [24] therefore happen a pandemic [25].

Through the year 2012 is respiratory illness the MERS that was first pointed out in Saudi Arabia. The dead of this illness was rate about 35% [26]. The examination observed incubation period of SARS-CoV-2, SARSCoV, and MERS-CoV, was similar. Whereas, the incubation periods of SARS-CoV-2 (COVID-19) was the longest (14 day), therefore the individuals are isolated for 14 days to protect from the danger of infect [27]. The genome sequence was similar of novel coronavirus (SARS-CoV-2) and SARS-like CoVs, therefore different estimates in the splitting location in the SARS-CoV-2 S protein was lost in other SARS-like CoVs [28]. The furin-like division site is an act to treatment target for furin inhibitors. The infection of SARS-CoV-2 was higher than to it is previously SARS; these results may be due to a mutation that happened in the endosome-linked with protein-connected the domain of nsp2 protein.

There are two potentialities for the transport of COVID-19 it is transmitted from human to other human or directly from bats [10]. Moreover, **Graham *et al.*** [29] indicated that the SARS-CoV originated from the bats and jumped to as a host to become better bounding to intermediate host. This intermediate host-appropriate virus, through their following exposure to humans, elevated to the epidemic strain.

Enhancing immunity by dietary recommendations during the COVID-19 pandemic

Coronavirus disease (Covid-19), points out a significant general health danger to the world. Meanwhile, it would not be a nutrition inhibitor or therapy Covid-19 transmission and it could be a balanced food to give a strong immune system, activity for the body and healthy sleeping habits.

When healthy eating is estimated for coronavirus pandemic, recommendations for health are as follows;

Healthy eating is important in quarantine applications.

Covid-19 is social isolation, and all contacts are minimized, which could be two weeks period to therapy additionally nutrition as a portion of quarantine. The diet is rich in proteins, fibers, vitamins, minerals, and antioxidants, as well as balanced nutrition, is of great significance through these times with a better diet.

Vegetable and fruit consumption should be prioritized.

Vegetables and fruits for their daily and enough consumption should be preserved for every main meal. Therefore, a healthy meal plate had divided into three-quarter the first quarter consists of vegetables, the second quarter is grain products, and the residual quarter has contained fruits, protein foods, and dairy products (Figure 3). In addition, it is suggested to include enough water consumption and utilize of olive oil in daily meals. Thus, food bought had contained vegetables and fruits. Therefore, could preserve healthy food during the quarantine.

Figure (3): "Healthy Food Plate: Healthy Food Plate According to Food Groups" from Turkey Dietary Guidelines [26].

Importance of minerals and vitamins consumption

Micronutrients are minerals and vitamins which are required in very tiny amounts [30]. But together both are extremely important for the normal body functioning in the organism [31]. They are involved in triggering many important biochemical reactions [32]. However, micronutrients are getting attention all over the world during the COVID-19 pandemic for its ability to alter the susceptibility to infection [33, 34]. Cytokines (certain cells secreted substances that affect other cells) lead to inflammation through damaging the lining of the lungs, leading to pneumonia. Vitamins and cytokines modulate immunity and inflammation. Immunity involves vitamins renovate the capability of some cells to produce certain cytokines that affect the mechanism of immune cells [35]. Vitamin E is indispensable to get rid of chronic viral infections [36]. Different water-soluble vitamins like vitamin B complexes, vitamin C, and fat-soluble vitamins (Vitamin A, vitamin D, and vitamin E), different trace elements (Zinc, Magnesium, Iron, and Selenium) have been proved to show a satisfactory effect on enhancing human immune response. Adequacy of iron can protect from respiratory tract infections in severely critically infected coronavirus patients. Essential fatty acids such as omega-3 fatty acid that modulate immune function by its action on inflammatory response [37]. Magnesium is associated with the immune system in both innate and acquired responses. It acts as a cofactor for participation in immunoglobulin synthesis and antibody production. Magnesium is the most overlooked electrolyte, although it has an enormous role in immune function [38]. Hence, the good nutritional status of the host plays a crucial role to deal with different infectious diseases [39]. Therefore, proper nutrition must be ensured to deal with unexpected infections with people who are vulnerable or who are already attacked by a novel coronavirus. If through diet, the daily required amount of different nutrients are not met, different processed food, and fortified with different nutrients can be a solution. These Micronutrients were found the significant role of some food nutrients to tackle harmful RNA viruses including SARS virussee-through boosting up immunity [40].

Vitamin C is the production of interferon that can influence the immune system in addition is absolutely necessary to the white blood cells that help to fight

infections and overall immune system health. Vitamin C is of great significance for iron absorption, and iron deficiency can confirm vulnerability to infections in general [41]. Therefore, food fortification with vitamin C in places of high coronavirus recrudescence is recommended.

As COVID-19 happened the coagulopathy and thromboembolism are predominant and connect to reduce survival. Therefore, vitamin K management becomes better results in patients with COVID-19 [42]. Thus, it could be recommended that utilize vitamin K-rich food sources such as green leafy vegetables and vegetables in food formulations in places of high coronavirus recrudescence especially for COVID-19 patients

Zinc shortage is responsible for 16% of all respiratory infections worldwide and also it could be found the link of zinc shortage with the danger of infection and acute progression of COVID-19 [43]. Supplement of Zn has the possibility to promote antiviral immunity, both innate and humoral, and to become better normal immune cell function, in immune-compromised or elderly patients. Zn may also act synergistically when co-administered with the standard antiviral therapy, for patients with SARS-CoV-1. In addition, it was protecting the cell membrane which could contribute to blocking the virus entry into the cell. Therefore, it may be hypothesized that Zn supplementation may be of potential benefit for prophylaxis and therapy of COVID-19, especially for those who have a Zn shortage [44].

Legumes could be consumed every day.

Legumes are a protein source alternative with a high nutritional value. Therefore, different varieties of legumes could be consumed every day. In addition, these products can be soaking in water, Thus, that is cannot take time during cooking, and then stored in the freezer to consumed. Consequently, these different varieties of legumes were prepared at home as an alternative to buying them in quarantine times.

Importance of high-quality animal protein consumption

Eggs and cheese are contained a high-nutrition value of animal protein therefore it could be consumed enough every day due to include the achievement of antibodies, which great significant defense of the bodies against microorganisms [45]. Moreover, useful bacteria as probiotic was found in yogurts are support the immune system. Probiotics defined as "live microorganisms that, when administered inadequately amounts, confer a health benefit on the host" [46]. Probiotics can act improve immune function, by the production of antimicrobial and organic acids compounds additionally, being improved the gut [47]. **Azad *et al.*** [48] studied that the probiotic species as the *Lactobacillus* and *Bifidobacterium genera*. The results have shown that fermented dairy products could be a good choice to become better the gut microbiota.

Effect of natural antioxidants in coronavirus infections

Glutathione is a strong natural antioxidant in the body, it improves the immune system and it is also used as a nutritional supplement. More research on viral infections for rats showed that N-Acetylcysteine production from glutathione has decreased the period of symptoms by elevating cellular defense and repair. Therefore the glutathione can be taken orally at level 500 mg [49].

Quercetin is a natural antioxidant was found in fruits and vegetables. Quercetin can inhibit infections involved in coronavirus. Quercetin protects lung tissue and also supplement is interested in vitamin C. Therefore, it could be taken orally at level 500 and 1000 mg daily [49]. Quercetin is found in fruits and leafy green vegetables, and black tea [49].

Tannins were known for antiradical activities and anti-inflammatory influences, thus tannins as strong antioxidants can decrease disease dead may be due to redox balance conservation. Gallotannin from tannins was found as anti-inflammatory influences [50]. Tannins are found in constituencies' herbs, spices, nuts; legumes; orange juice; and tea, as well as could be utilized for food formulations in places of high coronavirus infection.

Nutrition recommendations for healthy humans

1. To the power immune system is supplying enough

diet daily for healthy humans.

2. Healthy humans should be to the consumption of fruits and vegetables through period coronavirus pandemic which presents of great significance public health threat in the world

3. Healthy humans could supplement their diet with nutritional supplements to include the constituent of their duties.

4. Healthy humans should be not be found in crowded places and also using digital platforms for meetings.

Potential therapeutic strategies against COVID-19

Uses interferons as an antibiotic, and antiviral to decrease the viral load [51, 52] however, the only remdesivir has shown promising impact against the virus [53]. Remdesivir is an interferon-beta blocker the SARS CoV- 2 replication and patients were declared as clinically recovered [54, 55]. **Richardson *et al.*** [56] estimated combining the antiviral with traditional Chinese medicines were estimated against SARS CoV-2 induced infection in humans and rats. The results reported that exhibit moderate when tested against infection inpatients and in-vitro clinical isolates [57]. Doctors isolated the blood plasma from patients which return to a normal state of health from COVID-19 and inject it into the infected patients the results were found positive recovery for patients [58]. New research specified that the monoclonal antibody (CR3022) binds with the SARS-CoV-2 may be caused to the divergent ACE2 receptor-binding. Moreover, it has been the possibility to be as a therapy, alone or in collection with other antibodies for the treatment of COVID-19 infection [59].

The balance of intestinal micro-ecology and nutritional support

COVID-19 patient is to the stomach and the intestines symptoms that may be caused to immediate viral infection of the intestinal mucosa. The intestinal micro-ecological balance is broken to COVID-19 patients, which is an important lowering of the intestinal probiotics. Therefore it was significant to preserve the micro-ecology using nutritional support.

Microecologics Intervention

(1) Microbiologics can increase the activity of gut bacteria, and decrease infection reduced by gut microflora dysbiosis.

(2) Microecologics can become better the stomach and the intestines symptoms of patients. It can decrease water in feces and lowering diarrhea by preventing intestinal mucosal atrophy.

(3) The hospital analyzed and discovered the disturbance of intestinal flora. Therefore, it could decrease the available as another possibility of intestinal bacterial translocation and gut-derived infection.

(4) Food assistance is significant to preserve intestinal micro-ecological equilibrium. Therefore, it could be utilized based on the influential estimations of food dangers, gastroenteric roles, and ambition hazards.

Nutrition support

Disease COVID-19 patients are at elevate nutritional risks. Therefore, happening estimations of nutrition dangers, stomach, and the intestines roles, and enteral food assistance is significant to the patient's prognosis [60].

(1) Feeding orally is preferred could be, early intestinal nutrition can supply nutritional support, nourish intestines, and preserve intestinal microecology.

(2) Almost all patients often harbor sharp stomachs, and intestines harm apparently as abdominal distension, and diarrhea thus could be recommended using post-pyloric feeding.

(3) It could be recommended that the chosen nutrient solution for patients with intestinal danger, had contained predigested small peptide which absorption in intestinal. For hyperglycemia patients, it could be recommended that nutrition is beneficial to the blood sugar controlling.

(4) Means of nutritional supply was taken by the pump of nutrients utilized at a uniform speed and gradually increasing. In addition, the nutrients can be heated before feeding to lower intolerance.

Conclusions

This review provides an insight into the COVID-19 current situation and represents a picture of the current state of the art in terms of public health impact, immunity, and the role of food in prevention, case management, emergency response, and preparedness. People with short immunity are the most affected by this global epidemic. To help or boost the immunity, the plant-based foods play vital role by promoting beneficial bacteria in the body.

Future aspects need more study to know the behavior of the Coronavirus and the role of food in preventing it. In nutshell, healthy vegetables, fruits, proteins, and drinks are essential against the new Coronavirus by improving the immunity of all age groups.

Consent of Ethics

No possibility of a conflict of benefit was reported by the authors.

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