

The Role of Balanced Nutrition for the Recovery of COVID-19 Patients Undergoing Self-Isolation

Heny Yuniarti^{1,2}, Reza Adityas Trisnadi¹

¹ Fakultas Kedokteran, Universitas Islam Sultan Agung Semarang, Semarang, Indonesia

² RSI Sultan Agung Semarang, Semarang, Indonesia

***Corresponding Author**

Jl. Kaligawe Raya KM.4 Kota Semarang

E-mail: henyyuniarti@unissula.ac.id

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Abstract

Coronavirus (COVID-19) is an infectious disease caused by the SARS-CoV-2 virus. Not all COVID-19 patients are reported to have severe symptoms. There are also patients who are asymptomatic or with mild symptoms who only need rest and self-isolation. Self-isolation is an attempt to separate a person confirmed COVID-19 with or without symptoms, from a healthy person which aim is to reduce the risk of transmission. Nutritional intake in patients with COVID-19 includes energy needs from macronutrient, micronutrients, fluids and electrolytes. A balanced diet can support a strong immune system and help fight viral infections. In this activity, the method used was WhatsApp media or android /web-based applications. Patients are classified into 3 groups, namely asymptomatic groups or mild symptoms, without decreased oxygen saturation (green group), patients with moderate symptoms, oxygen saturation still above 95% (yellow group), patients with severe symptoms and saturation below 95% (red group). Virtual consultations are conducted with the aim of reminding a balanced nutrition intake in patients, guiding cough techniques and warning signs of COVID-19. This activity provided lunch support consisting of rice, vegetables, animal protein, side dishes and fruit that can hasten healing from COVID-19.

Keywords: COVID-19; self-isolation; balanced nutrition

INTRODUCTION

Coronavirus (Covid-19) is an infectious disease caused by the SARS-CoV-2 virus. In late December 2019, the coronavirus was recognized as the cause of a group of cases of pneumonia with an unknown etiology in Wuhan, Huanan. A seafood wholesale center in China's Hubei Province that was the initial location of coronavirus 2019 (COVID-19) were found. The coronavirus quickly spread widely, resulting in epidemics across China, followed by a pandemic, which was marked by an increase in the number of cases in various countries around the world (Özdemir, 2020).

Coronavirus is a positive single-strain RNA virus, non-segmented. There are four genus: Alpha coronavirus, betacoronavirus, deltacoronavirus and gamma coronavirus ((PDPI), Perhimpunan Dokter Paru Indonesia, 2020). According to WHO, the massive spread of COVID-19 has reached more than 10 countries globally and may infect 20 million people (Sheshe, et al., 2020).

COVID-19 infection can cause mild, moderate, and severe symptoms. The main clinical symptoms that appear are fever (temperature > 38°C), coughing and difficulty breathing. In addition, it can be accompanied by tightness, fatigue, myalgia, gastrointestinal symptoms such as diarrhoea and other airway symptoms. Half of patients develop tightness within a week. In severe cases of rapid and progressive worsening, such as ARDS, septic shock, metabolic acidosis that is difficult to correct and bleeding or dysfunction of the coagulation system within a few days. In some patients, symptoms may appear mild and no fever. Most patients have good prognosis, with small percentage in critical condition even death (Lin, Lu, Cao, & Li, 2020).

Recent reports estimate 80% of cases asymptomatic or mild; Another 15% of cases are severe (the infection requires oxygen); and 5% critically require ventilation and life aids. For patients without or with mild symptoms, patients can undergo self-isolation. Self-isolation is an attempt to separate a person confirmed COVID-19 with or without symptoms, from a healthy person who aims to reduce the risk of transmission, even in their own home (Center For Disease Control and Prevention (CDC), 2022). Self-isolation can be effective in slowing the spread of infectious diseases and is an action that a person does to protect others.

Criteria for completion of isolation and recovery in confirmed cases of COVID-19 using several guidelines including in confirmed cases that are asymptomatic, isolation is carried out for at least 10 days from the collection of confirmed diagnosis specimens. In symptomatic confirmed cases, isolation is carried out for 10 days from the appearance of symptoms coupled with at least 3 days free of fever and respiratory disorders. Hence, symptom that last for 10 days or less should undergo isolation for 13 days. (Menteri Kesehatan Republik Indonesia, 2021).

Self-isolation results in adverse effects on nutritional status. In a Belgian study, 10% of participants were often unable to eat a healthy diet during self-isolation. The trend of fruit and vegetable consumption decreases and consumption of soft drinks, sweets, bread, and salty snacks increases (Rodriguez-Leyva & Pierce, 2021). A recommendation for COVID-19 patients is to follow a healthy diet to maintain proper immune function. Optimal intake of all required nutrients, especially those that play an important role in the immune system, must be ensured through a diverse and balanced diet. (Fernández-Quintela, et al., 2020).

The Indonesian Association of Clinical Nutrition Specialists (PDGKI) has created a guide for nutrition in patients with COVID-19. Some of the components of good nutrition are met when a person is affected by COVID-19 including the energy needs of macronutrient and micronutrient, adequate fluids, and electrolytes. Energy needs are calculated based on nutritional status, clinical and hemodynamic conditions, supporting examinations, and the presence of comorbid diseases with calculations of 30–35 kcal/kg/day, consisting of carbohydrates 50-60%, protein 15-25%, and fat 25-30% in order to support healing in Covid-19 patients who are infected by providing the needed nutrients.

In COVID-19 patients, changes in glucose metabolism occur in the form of a decrease in the supply of oxidative glucose energy, an increase in glycolysis, gluconeogenesis, insulin resistance and blood glucose. Carbohydrate administration takes into account for patient's respiratory condition and comorbid diseases, such as diabetes. Giving excess amounts of glucose will increase blood glucose, increase CO₂ production, increase fat synthesis, and increase insulin needs. It is recommended to lower the ratio of glucose: fat to 50-70: 50-30.

In COVID-19 patients there are also changes in protein metabolism, namely protein breakdown, increased acute phase protein synthesis, decreased muscle protein synthesis, and changes in amino acid profile, such as decreased concentration of branched chain amino acid (BCAA). Protein administration exceeding 2g/weight in kg/day does not provide clinical benefit

and does not address protein catabolism. The administration of protein also considers patient's kidney function.

In COVID-19 patients there are also changes in fat metabolism, which is causing mobilization and fat breakdown (PDGKI, 2020). Balanced nutrition is important in Covid-19 patients, as well as in healthy people in the pandemic period given by the Ministry of Health. In the contents of food dishes eaten daily, there are good foods that contain carbohydrates, animal and vegetable proteins, vegetables and fruits that are rich in mineral vitamins and fiber. Preferably colored vegetables and fruits because they contain various vitamins as antioxidants.

A balanced diet can support a strong immune system and help fight viral infections. Patients who undergo self-isolation can also take various vitamins in appropriate amounts if it is felt that vitamin intake from food is lacking during the healing period. The recommended daily diet for various vitamins varies, for example for vitamin C of 90mg/day for men and 75mg/day for women (Aman & Masood, 2020). In addition, Vitamin A plays an important role because of its involvement in the formation of a healthy mucus layer in the respiratory tract, as well as improving non-specific immune responses. Another vitamin is vitamin D, research that studies the role of vitamin D levels in the prevention of infections and deaths caused by the COVID-19 virus. Vitamin E plays an important role in the reduction of oxidative stress, providing anti-inflammatory effects. In addition, vitamin E also protects polyunsaturated fatty acids (PUFAs) and immune cells from oxidation. Other micronutrients in addition to vitamins are also needed such as the mineral Zinc, there are studies showing that increased concentrations of Zn^{2+} inhibits the replication of SARS-coronavirus (SARS-CoV). Zinc deficiency is associated with an immune response mediated by damaged cells, as well as with increased susceptibility to various infections. Increased zinc intake is expected to have beneficial effects on COVID-19 infection by reducing gastrointestinal and lower respiratory symptoms (Fernández-Quintela, et al., 2020). Patients are also encouraged to drink 8-10 glasses of water every day to help transport nutrients in the blood, dispose of waste, and regulate body temperature; as well as maintaining a healthy lifestyle with exercise, and regular sleep. Getting enough sleep will help support immune function (Aman & Masood, 2020).

METHOD

The method of community service activities was carried out using WhatsApp media or android / web-based applications. Virtual homecare is a solution to minimize the risk of COVID-19 transmission because no direct physical contact occurred, provide ongoing care to patients with the ultimate goal of reducing morbidity and mortality due to COVID-19. UNISSULA'S virtual homecare involves human resources from the Faculty of Medicine, Faculty of Nursing Sciences, Faculty of Psychology.

The methods of community service activities are as follows:

1. Patients fill out the google form link that has been provided, after the complete automatic data will go to the list of consultation patients.
2. Medical personnel will perform anamnesis on patients including clinical symptoms, treatment that has been obtained, laboratory examinations that have been done, including the results of oxygen saturation if measurement has been taken.
3. Medical personnel put patients into 3 groups based on results at point 2. Groups without symptoms or mild symptoms such as cold, cough, fever, and no decreased oxygen saturation in the green group. Patients with moderate symptoms such as cold, cough, fever and severe shortness of breath but oxygen saturation is still above 95% included in the yellow group. Patients with cough symptoms, fever, shortness of breath and saturation below 95% fall into the red group.

4. The categorized groups of patient can continue self-isolation with supervision every day until completion for 14 days, patients who categorized into the yellow group self-isolation with supervision every day and during the supervision period if there is a decrease in oxygen saturation below 95% is recommended to immediately find health facilities, while patients who fall into the category of red group are advised to immediately find health facilities for hospitalization.

Patients categorized in green and yellow groups, in addition to getting pharmacology therapy consultations for covid 19, education about physical activity that can be done during self-isolation is also given to meet balanced nutrition while undergoing self-isolation. The fulfilment of balanced macronutrients including carbohydrates, proteins, fats and micronutrients including vitamins and minerals. This poster below is shared with the public online for instructions on the implementation of activities.

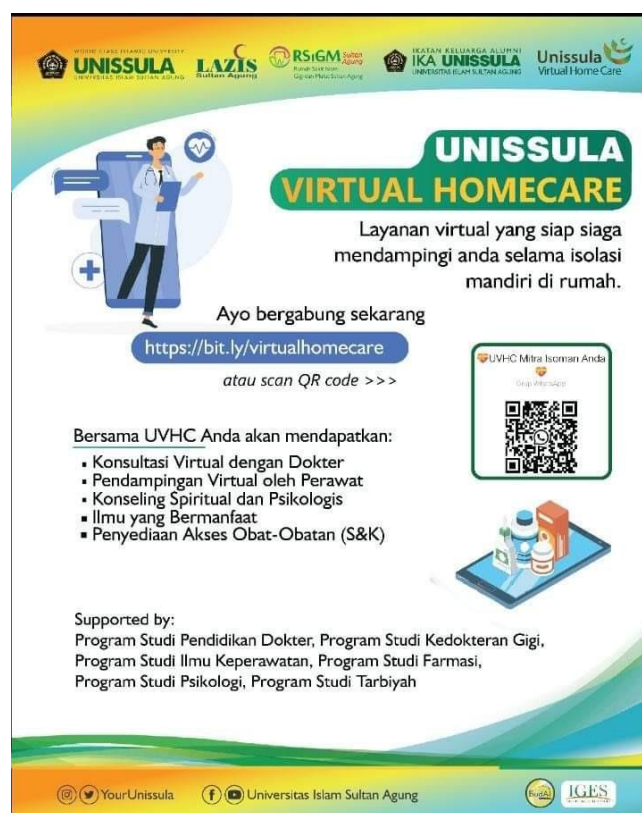


Figure 1. Poster view shared in public

RESULTS AND DISCUSSIONS

The service was carried out starting in July 2021 virtually, a total of more than 70 patients who benefited from UVHC and spread throughout Indonesia. Based on the method of activity, after the patient registers online the patient will be carried out anamnesis first by the medical student to facilitate classification in accordance with the symptoms, then the patient is categorized into the yellow, red, and green group for consultation with a doctor and monitoring. When consulting a doctor virtually, the doctor will ask the patient's symptoms, the length of time the symptoms, the treatment that the patient has received. Doctors also ask about diet during the

patient undergo self-isolation, what food should be consumed and the types of foods that should be avoided. The consultation was conducted by 1 doctor and 1 nurse as shown below.



Figure 2. Documentation of the virtual consultation

Figure 2 describes about the consultation conducted by the patient's family, the patient's wife whose husband experienced symptoms of COVID-19. Patients on this occasion cannot consult directly virtually using video calls because he was in a state of shortness of breath and did not strong enough to talk for a period of time, heteroanamnesis are carried out. Doctors and nurses listen to symptoms told by the patient's wife carefully, after the doctor finishes prescribing drugs that can be purchased by the patient's family including vitamins. Patients are also taught the correct cough technique, sunbathing activities at 09-10 am for 15-30 minutes as well as evaluation of oxygen saturation periodically and immediately heading to the health facility to be hospitalized if symptoms worsen and oxygen saturation drops below 95%. We also reminded patients to eat a balanced diet that contains macronutrients in the form of protein, carbohydrates, fats in accordance with the recommended composition. Patients are also encouraged to meet the needs of micronutrients and fibbers from vegetables and fruit and drink enough water 8-10 glasses a day.

During the lockdown, the search for nutrition-related information outside of Google has been explored by some studies. For example, a study in the United Arab Emirates found that the most cited source of nutrition-related information was social media (67.8%), followed by local and international health authorities (48.7%), healthcare professionals (45.7%), friends and family (38.1%), television (17.0%), and newspapers (5.0%). Similarly, a study involving 18 countries in the Middle East and North African region identified most respondents (70.8) citing

social media as source of nutrition information during the lockdown compared with 3.7% for newspapers and 41.3% for healthcare professionals.

The use of technology as a potential solution to continue nutritional services and reduce the impact of the virus and lockdown among individuals with pre-existing conditions has been explored. In a randomized controlled trial, telemedicine was used as a tool for dietary intervention among non-alcoholic fatty liver disease-human immunodeficiency viruses (NAFLD-HIV) patients during the COVID-19 lockdown.

COVID-19-related changes in dietary habits and lifestyle constraints may lead to poor nutritional status with coexistence of obesity and related chronicity and underweight/unintended weight loss and micronutrient deficiencies, both physiological alterations which lead to higher susceptibility to COVID-19. The place of nutrition, in the absence of specific therapeutic treatment and even with the availability of vaccines, for an effective functioning of the immune system to aid in the management of the COVID-19 disease cannot be overemphasized. A healthy balanced diet with the appropriate myriad of macronutrients and micronutrients supports disease-reducing immunity.

With new SARS-CoV-2 variants emerging and no end in sight soon to the current pandemic globally, it is crucial to escalate the ongoing clinical trials, nutrimentalomics, and cell signaling dynamics of several nutrients and bioactive compounds and their link with the immune system in nutrition science research to establish nutrition at the frontlines in fighting COVID-19. Such challenging times present an important opportunity for dietitians, nutritionists, and nutrition scientists to give clear advice and recommendations to the population and the medical community, respectively, on the impact of nutritional status in COVID-19 outcomes.

The relationship between nutrition and the immune system is well known, so much attention is being paid to its role in COVID-19. In this sense, although it does not appear to be a cure for COVID-19, healthy eating patterns seem to optimize the immune system function and contribute to a lower probability of COVID-19 contagion and to recover better in those who have suffered it. This fact is especially important considering the healthcare overload due to the pandemic, highlighting the importance of nutrition in the correct general health and immune response of the population. Specifically, the Mediterranean diet and other dietary strategies that reduce inflammation and the risk of chronic disease could reduce the risk of severe disease and mortality from COVID-19. In addition, certain nutrients such as vitamins A, B related vitamins (folic acid, vitamins B6 and B12), vitamin D, vitamin C, and the minerals Se, Fe, Cu, and Zn, are important for proper immune function. Therefore, it is plausible to believe that deficiencies and a suboptimal nutritional status of these micronutrients could potentially favor the spread of COVID-19 by reducing resistance to infection and reinfection.

Comprehensive management including nutritional therapy for critically ill COVID-19 patients who are under very severe stress, this causes a high risk of malnutrition. Malnutrition refers to the wrong intake of energy and macronutrients (carbohydrates, protein, fat), as well as deficiencies of micronutrients (minerals and vitamins).

The process of viral infection and inflammation can increase the risk of malnutrition. To prevent this, it is necessary to calculate the appropriate energy requirements. In COVID-19 patients there is an imbalance in energy needs. In this condition there is an increase in energy consumption caused by factors such as fever, increased work of the respiratory muscles and mechanical ventilation. Increased energy consumption will increase energy demand. Energy requirements are calculated based on nutritional status, clinical and hemodynamic conditions, investigations, and the presence of comorbid diseases.

The provision of nutritional therapy to COVID-19 patients is very necessary because when this virus manages to enter the body it can cause immune system disorders and inflammation so that it requires comprehensive management including nutritional therapy. Carbohydrate needs 50-60%, protein 15-25%, fat 25-30% of total energy needs. Micronutrient requirements vitamins A, C, D, E, B6, B12, and folate, iron, magnesium and trace elements including zinc, selenium and copper play important roles in disease susceptibility and maintenance of immune function. Consumption of fruits and vegetables as a source of vitamins, minerals and antioxidants should be prioritized.

Patients undergoing self-isolation are also given access to lunch support that will be delivered to their respective homes where patients undergo self-isolation. The food consists of rice, vegetables, animal protein, side dishes and fruit in accordance with the recommended composition as in the picture below.



Figure 3. Lunch support with recommended composition.

Foods that contain a lot of oil need to be reduced, such as fries to help reduce the cough. Packaged drink or foods that contain high sugar also reduced.

CONCLUSION

A balanced nutrition is essential to support recovery in COVID-19 patients undergoing self-isolation. Intake of foods containing carbohydrates, proteins, fats, fibers, and vitamins is needed by patients as a source of energy for the body's metabolism and anti-oxidants. Hence, the body's endurance remains optimal and the patient can pass self-isolation well and heal perfectly.

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