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Coronavirus Disease 2019: Quick Diet and Nutrition Guide for Patients With Chronic Kidney Disease

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Abstract: Considering the Covid-19 pandemic and that patients with CKD are included in a high-risk group, a quick nutrition guide for patients with CKD in all stages was developed, and it is available in Portuguese at https://bit.ly/2zfSjl0, in English at https://bit.ly/covid19ckd, in Spanish at https://bit.ly/guia enfermedad renal and in French at https://bit.ly/covid19maladierenale.

ON MARCH 11, 2020, the World Health Organization declared Coronavirus Disease 2019 (COVID-19) a pandemic, pointing to more than 7,000,000 confirmed cases of the coronavirus illness in virtually all countries and territories around the world, with 408,000 deceased persons as of June 10, 2020, and the sustained risk of continuous global spread.

Chronic kidney disease (CKD) may be associated with a more severe form of COVID-19.[1-5] Dietary interventions improve health outcomes, quality of life, and health behaviors for many chronic diseases, including CKD. Self-management through an adequate diet provides beneficial results in reducing symptoms and disease progression in CKD.[6]

Considering this scenario, we developed a quick nutrition guide for patients with CKD in all stages (a high-risk group for COVID-19), including staying at home as long as possible and following an adequate diet plan. For an illustrated and more detailed information about nutritional interventions in CKD during COVID-19, guides available in Portuguese at https://bit.ly/2zfSjl0, in English at https://bit.ly/covid19ckd, in Spanish at https://bit.ly/guia enfermedad renal, and in French at https://bit.ly/covid19maladierenale.

Why Is It Important to Follow the Recommended Diet During This Pandemic?

Patients with CKD are at high risk of contracting COVID-19,[7] and although the biochemical and pathophysiological mechanisms are still not detailed, COVID-19 is more severe in patients with obesity, cardiovascular disease, diabetes mellitus, and hypertension, which are common comorbidities in patients with CKD.[8] A healthy meal plan and lifestyle may help regulate blood pressure and blood glucose levels, as well as improve immunity.[9-12]

Patients with CKD should consume minimally processed natural or whole foods such as fruits, vegetables, rice, lean meats, and home-cooked meals (instead of buying foods from a restaurant or processed foods from the market). However, when fresh fruits and vegetables are not available, canned vegetables and fruits low in sodium and sugar can be included in the diet. On the other hand, most of the processed foods with excess amounts of sodium, such as sausages and cold cuts, and excess sugar, such as cakes, cookies, candy, and sugar-sweetened beverages, should be consumed rarely. Milk and other dairy products, legumes (e.g., beans), and high-fat meats should be limited in the diet according to the diet prescription.[11] It is also essential to maintain proper hydration (except for those undergoing chronic hemodialysis who follow a more restricted fluid intake).

Intake of foods high in potassium (K^+) should be monitored in patients with high serum potassium levels.[12] Patients with frequent hyperkalemia should be advised to prepare tuberous root vegetables such as potatoes before cooking to reduce their potassium content. These vegetables should be washed, peeled, and diced and put in a pan

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with water to cook. After the boil for 15 minutes and throw away the cooking water, consuming only the cooked vegetable.[13-15]

Patients who live in tropical areas are prohibited from eating carambolas, also known as star fruit, given the accumulation of toxic substances.[16]

It is important to remember that a low-protein diet (0.55-0.60 g dietary protein/kg ideal body weight/day)[12] and a plant-dominant low-protein diet with more than 50% plant-based sources are recommended for nondialysis patients with CKD; these diets may have beneficial effects for CKD patients.[17] For chronic dialysis patients, the recommendation is a dietary protein intake of 1.0 to 1.2 g/kg body weight per day, and for all CKD stages, the recommendation for energy intake is 25 to 35 kcal/kg body weight/day.[12]

Additional considerations for patients with CKD during the COVID-19 pandemic involve tips to improve their immunity. The immune system is very complex; therefore, many nutrients are needed to make it function properly. A healthy diet (rich in fruits and vegetables) containing a variety of macronutrients and micronutrients can provide a significant amount of minerals, vitamins, antioxidants, and bioactive compounds, which mitigate the inflammation.[18,19] Studies have shown that turmeric (curcumin), nuts, and propolis can improve the immune system as listed below:

- **Turmeric:** this spice can be added (approximately 1.5 g/day) in stews and juices.[20]
- **Brazil nuts:** 1 nut per day.[21]
- **Propolis:** it can be diluted with water (around 20-30 drops).[22]

Healthy Gut Microbiota

Studies have also emphasized that healthy gut microbiota is essential to mitigate inflammation and improve the immune system's function. It is also known that patients with CKD, older adults, and respiratory viral infections present dysbiosis. In this direction, nutritional strategies should be adopted, especially now, during COVID-19.[23-25] A high fiber plant-based diet should be recommended, given their favorable effect on the microbiome[17] and gut transit time that may improve constipation.[26,27]

Vitamins and Minerals

Some studies are also examining the use of vitamin and mineral supplements during the COVID-19 pandemic. Vitamin D has an essential role in innate immune system functions, but there is no strong scientific evidence (with randomized controlled trials) to prescribe a high dose of vitamin D for this patient population.[28] Moreover, although vitamin C has numerous beneficial effects on the immune system, there is insufficient evidence to recommend high doses of vitamin C for the treatment of COVID-19.[29] However, natural sources of these vitamins and polyphenols are important and should be included in the diet.[30]

Zinc is an essential micronutrient that modulates antiviral and antibacterial immunity; it regulates the inflammatory response by controlling the expression of several genes involved in inflammation and antioxidant defense[31] beneficial effect as a preventative and auxiliary therapy for COVID-19.[32] However, despite the promising results with COVID-19, there are only a few unfinished trials (ClinicalTrials.gov),[33] and more studies are needed. Selenium is another trace element with antioxidant effects and anti-inflammatory properties.[21] Some clinical benefits of selenium supplementation in viral infections have been reported,[34] and 1 study showed an association between reported cure rates for COVID-19 and selenium status, but the study presents a range of limitations.[35] Therefore, selenium supplements should be taken with caution.

Other Nutrition Considerations

Other important topics to consider during this pandemic is to limit the number of times you go outdoors, given the importance of social distancing, and also how to store or shop for food. Staying at home at much as possible is very important. Thus, CKD patients should try to use the foods available at home to prevent frequent trips to the grocery store. Following are some practical tips you can use to limit the time spent outside your home:

Breakfast and snacks—Foods that can substitute for bread: manioc (cassava), sweet potato, yam, corn, popcorn, homemade cakes, and biscuits.

What is the best choice for a good meal?—Greens (braised kale) + vegetables (grated carrots) + legumes (beans) + cereals (rice) + meat (grilled steak) + fruit. Note: it is important to have all the food groups in the meal. Be aware of the serving size of protein; this will depend on the disease and treatment stage. Smaller portions for conservative management of CKD (nondialysis) and a larger portion for dialysis patients.[11]

How to make vegetables last longer?—there is a simple solution for this—blanch the vegetables. Follow these steps for blanching:

1. Chop vegetables into small pieces;
2. Place the vegetables in boiling water for about 2 to 3 minutes (this step must be done in an uncovered pot);
3. Drain the vegetables;
4 Place them to a bowl with ice to stop the cooking process;
5. Finally, store the vegetables in a tightly covered bowl or freezer storage bags and then freeze.

What foods can be frozen?—Fruits, vegetables, sauces and purees, herbs, meats, cooked beans, and bread.

How to defrost frozen foods?—Take the bag with the food out of the freezer and put it in the refrigerator until it defrosts, or you can put it under cold running water or in the microwave to defrost faster. Remember that small portions or frozen ready meals can be cooked immediately, without defrosting. It has not recommended refreezing food that has been defrosted because the risk of food poisoning is greater, once the shelf life is shortened. Do not defrost food at room temperature, especially meats, because microorganisms can multiply and lead to food degradation. Never refreeze raw meats, fish, or poultry. You can only refreeze these foods after cooked, as long as they have been cooled in the refrigerator before going into the freezer.[36]

Tips about freezing fruits and herbs: Freeze fruits already chopped in a bowl and use them to make juices and smoothies. Then, wait until the food cools down before putting it in the freezer. For herbs, put them chopped in ice trays, cover with cold water and freeze. After that, put the cubes in plastic bags in the freezer.

Remember herbs such as rosemary, sage, and thyme should not be chopped, keep them with short stems.

Also, it is crucial to reduce the risk of food poisoning. The Centers for Disease Control and Prevention[36] has created 4 simple steps to reduce the risk of food poisoning:

- **Clean:** Wash your hands with clean water and soap (20 seconds). Also, wash the utensils, fruits, and vegetables.
- **Separate:** Raw eggs, seafood, meats, and poultry should be separated from other foods due to the possible risk of cross-contamination.
- **Cook:** Food should be cooked at the right temperature to kill microbes.
- **Chill:** Do not leave food at room temperature because microbes can multiply.

Can COVID-19 Be Transmitted Through Foods?

Studies have shown that the chance of transmission of coronavirus by food is likely low, and also there is no clear evidence that coronavirus can follow the fecal-oral pathways.[37,38] However, before preparing or eating food, it is vital to wash your hands with clean water and soap for at least 20 seconds. If hand washing is not an option, a hand sanitizer with at least 60% alcohol can be used. Although there is no evidence of transmission through food or food packaging, the transmission through contaminated surfaces, like packaging, cannot be ruled out.[39,40]

Tips for Patients Traveling to and From the Dialysis Unit

For dialysis patients, another important consideration is about the care on the way to and from the dialysis clinic. Patients should, when possible, go to the dialysis unit alone. However, when this is not possible, some steps must be followed, as published by Van der Sande et al:[41]

- The driver must be adequately guided by a health team about hygiene care including wearing a facial mask or covering;
- Vehicle windows should remain open, when possible;
- The patient must wear a mask or face covering at all times;
- In the vehicle, patients should have access to a 70% alcohol gel for hand hygiene;
- At the clinic, the patient must replace the used mask or face covering with a new one.

Tips on Grocery Shopping

- Wear your mask or face covering in the right way (i.e., both nose and mouth covered at all times);
- Make a grocery list before you go;
- Do not go to the store hungry;
- Avoid buying foods that are not on your list;
- If possible, use debit cards to pay (for faster service and limited exposure to the cashier);

It is too early to see the effects of nutritional interventions on COVID-19 treatment in CKD patients. It is important to remember that micronutrient deficiencies are related to an impaired immune system. However, no acute modification by a nutritional intervention such as vitamin or mineral supplementation has shown efficacy, including vitamins D and C, and even zinc or selenium supplementation. Adequate food intake should be the most important intervention for our CKD patients.

Practical Application

COVID-19 is a pandemic that has affected millions of people worldwide. In addition to individuals with comorbid conditions such as diabetes and cardiovascular disease being at high risk of contracting the virus, patients with CKD are included in this high-risk group. This nutrition guide and the accompanying slide presentations in various languages provide evidence-based information and practical suggestions for CKD patients as they go about their daily lives.

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