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# Culinary Medicine as a Core Component of the Medical Nutrition Therapy for Kidney Health and Disease



CULINARY MEDICINE, AN emerging evidence-based discipline in medicine, nutrition, and public health, combines the traditional art and skills of food preparation with the sciences of medicine and nutrition to maintain health and manage disease states. Culinary medicine is an important component of integrative and alternative medicine and allows health care providers including dietitians and physicians to adapt a more patient-centered approach to management of chronic diseases, including kidney disease.<sup>1</sup> Indeed, the traditional renal diet preparation, which is mostly a protein-controlled, low-potassium, low-phosphorus, and low-sodium diet, is an example of culinary medicine in nephrology. There are numerous cooking instructions to extract potassium content from food by different cooking modalities.<sup>2</sup> However, traditional low-potassium diets are often not well received by patients and health care providers. These low-potassium diets may lead to psychosocial consequences and health issues and negatively impact people living with chronic kidney disease (CKD); most such diets are associated with stringent and unhealthy restrictions and may even deprive patients from eating healthy foods.<sup>3,4</sup> With the recent paradigm shift in the field of renal nutrition to emphasize adequate intake of fresh fruits and vegetables and lower intake of animal-based proteins to achieve better kidney health,<sup>5,6</sup> there is an urgent unmet need in creating meal plans that entail pragmatic instructions in the context of food preparation and cooking. Emerging data suggest that a plant-dominant low-protein diet, i.e., >50% of the dietary protein coming from plant-based sources, may help slow the rate of CKD progression and can allow patients to avoid or defer transition to dialysis or transplantation.<sup>7-10</sup> These objectives are also consistent with the US Presidential Executive Order of July 2019 with the goal to reduce the annual incidence of kidney failure by 25% or more by 2030.<sup>11</sup>

In nephrology, culinary medicine is aimed at helping patients and health care providers understand and appreciate the value of food preparation and proper cooking as a part

of personalized medicine. An important focus of culinary medicine is about accessing and eating kidney-protective meals at home. Hence, culinary medicine is an important component of medical nutrition therapy for the management of kidney disease.<sup>12</sup> Consistent with these important ambitions, a group of dietitians working in the US Veterans Affairs (VA) medical centers have embarked on a unique health care innovation titled, Healthier Kidneys Through Your Kitchen.<sup>13</sup> This culinary medicine-based program teaches US VETERANS with CKD, and their care partners, practical ways to prepare meals at home, which is highlighted by Schlueter et al,<sup>13</sup> in this issue of the *Journal of Renal Nutrition (JReN)*. These pioneering VA dietitians also state that they strive to achieve earlier and more pragmatic implementation of nutrition interventions for VETERANS with earlier stages of CKD. In the participating VA centers under the Healthier Kidneys Through Your Kitchen program, renal dietitians serve as part of an interdisciplinary team providing monthly classes for patients with CKD. The dietitian-led portion of the class is nutrition education regarding a kidney-friendly diet and cooking including meal plans with reduced total and animal protein and a higher proportion of heart-healthy components consistent with a plant-dominant low-protein diet approach.<sup>8</sup> According to Schlueter et al,<sup>13</sup> the biggest shock for our class participants, who are often self-declared meat and potatoes guys, is the protein restriction, including avoiding high intake of animal-based proteins and adding more plant-based proteins.<sup>6-8</sup>

This important initiative by Schlueter et al reinvigorates the role of medical nutrition therapy in CKD management and can have major clinical and public health implications among numerous VETERANS who are at risk for or have underlying CKD as well as millions of Americans with these conditions.<sup>13</sup> The Healthier Kidneys Through Your Kitchen program may also generate critical data about the efficacy and safety of VETERAN-tailored meal plans and challenge the prevailing dialysis-centered paradigm in most VA and non-VA centers throughout the United States and globally. It is also aligned with the July 2019 US Presidential Executive Order's restructuring of the End-Stage Kidney Disease (ESKD) legislation program by preemptively involving patients and dietitians in earlier phases of CKD care rather than dialysis preparation.<sup>11</sup> This model stands in sharp contrast to the traditional US government payment system whereby the renal dietitians' focus of work is in the dialysis units, whereas patients at risk of kidney failure rarely have access to medical nutrition therapy.<sup>8</sup>

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The Healthier Kidneys Through Your Kitchen program<sup>13</sup> also innovatively emphasizes the important skill set provided by trained dietitians and other health care providers in CKD patient care outside the dialysis arena. Averting and delaying dialysis or transplantation will also result in major cost benefits to the health care system and higher patient and caregiver satisfaction.<sup>14-16</sup> Finally, this and other culinary medicine-based programs are also consistent with the *Precision Nutrition* and personalized diet plan for kidney health and kidney disease management.<sup>17</sup>

The potential benefits of culinary medicine for kidney disease are supported by several additional studies published in this issue of *Journal of Renal Nutrition*. First, Kanbay et al<sup>18</sup> presented the results of their systematic review and meta-analysis of clinical studies that have examined the effect of coffee consumption on kidney health and disease given that drinking coffee is one of the most common daily habits throughout the world. They found that coffee consumption was associated with a 14% reduction in risk for incident CKD with a greater decrease in persons taking 2 cups of coffee or more compared with a cup or less daily. There was 18% lower risk of incident ESKD among coffee users. Coffee consumption was also associated with 19% lower risk of albuminuria, and death rate related to CKD was 28% lower in coffee users. The investigators concluded that coffee intake is dose dependently associated with favorable kidney outcomes.<sup>18</sup> Whether these associations are causal or whether coffee consumption is a surrogate of other health-related behaviors remain to be determined in additional studies. However, encouraging coffee consumption to mitigate kidney disease progression in certain patients is a potential area for future research.

Gustatory function remains an important consideration for personalizing nutrition to manage diseases, but few studies have examined this issue in patients with kidney disease. In a prospective study of Taiwanese patients with CKD Stage 3 or higher to assess gustatory function using objective taste strip methods and subjective approaches, Chen et al<sup>19</sup> found that taste dysfunction was closely associated with frailty. They found that better gustatory function via taste strip scoring, better subjective taste function, and better oral cavity intactness were associated with 26%, 16%, and 6% lower probability of frailty, respectively. The investigators hypothesized that interventions aiming to ameliorate such deficits may bear the potential of reducing frailty severity in CKD population, which warrants clinical trials.<sup>19</sup> Similarly, Dawson et al<sup>20</sup> examined gustatory function in 298 ESKD patients including both those under conservative (nondialysis) management and those undergoing dialysis therapy and found that taste changes were significantly associated with upper gastrointestinal symptoms, including nausea, vomiting, anorexia, and dry or sore mouth as well as malnutrition. Whether impaired taste function in CKD and ESKD can confound culinary medicine-related strategies deserves additional studies.

Frailty and low physical strength are important considerations for determining nutritional strategies to manage diseases. Lee et al<sup>21</sup> examined the association of handgrip strength with relevant kidney health measures in 18,765 South Korean adults who participated in the Korea National Health and Nutrition Examination Survey during the 2014 to 2017 era. The prevalence of low handgrip strength was 4 times higher in those with CKD Stages 3 to 5, and a low handgrip strength was associated with 91% and 57% higher prevalence of CKD in men and women, respectively.<sup>21</sup> These data highlight the unmet need for more studies to examine muscle strength and sarcopenia including efficacy of tailored physical activity and exercise plans in persons with reduced kidney function.<sup>22</sup> The role of personalized nutrition and culinary medicine as interventions for persons with low muscle strength in kidney disease deserves more attention.

Hyperphosphatemia can be difficult to manage in many patients, and its management often adds substantially to existing pill burden. Culinary medicine holds the potential to reduce hyperphosphatemia-associated pill burden. Rastogi et al<sup>23</sup> have summarized strategies to control hyperphosphatemia based on a systematic literature review of clinical trials and real-world observational data on phosphorus control in hemodialysis patients. They suggest a more integrated approach to phosphorus control incorporating measurement of multiple biomarkers of CKD mineral and bone disorders and correlation between diet adjustments and medications to facilitate improved patient management. Similarly, Byrne et al<sup>24</sup> suggested that dietitians should translate guidance on restricting dietary phosphorus into nutrient-based strategies and food-based practical dietary advice for patients to follow. They argued that practical aspects of dietary advice are not well described in the literature, neither are the challenges of concurrently altering phosphorus while continuing to restrict other nutrients such as potassium. They discuss strategies to translate updated nutrient-level recommendations into practical dietary advice, which can be consistent with medical nutrition therapy in the context of culinary medicine.<sup>24</sup>

Culinary medicine could help mitigate constipation, which can increase risk of hyperkalemia in patients receiving maintenance dialysis. In a multicenter study in Brazil, Dos Santos et al<sup>25</sup> showed that low intake of plant-based foods in 305 patients was associated with constipation. In fact, almost a third of the patients in this study reported constipation, and an independent determinant of constipation was low fruit intake.<sup>25</sup> Another interesting report was from Daugirdas<sup>26</sup> who introduced equations to estimate the normalized creatinine generation rate in thrice-weekly hemodialysis patients with or without residual kidney function. His study suggests that use of these equations may facilitate broader investigation of these

approaches as a measure of nutritional status and outcome in patients with ESKD undergoing dialysis therapy.

Data are emerging regarding the importance of food preparation methods for disease management. In a randomized, double-blind, and placebo controlled trial in 100 patients from Chile with CKD and urine albumin-to-creatinine ratio  $\geq 30$  mg/g, Bunout et al<sup>27</sup> randomly assigned 3 months of 3,666 mg/day of docosahexaenoic and eicosapentaenoic acids (i.e., omega-3 fatty acid supplement) versus a corn oil supplement (placebo). A 20% reduction in urine albumin-to-creatinine ratio was observed in 19 intervention versus 13 control participants, and the predefined *P* was .27, and, hence, the investigators declared their trial negative but reported that pulse wave velocity and serum triglyceride levels improved under omega-3 fatty acid supplementation.<sup>27</sup>

Culinary medicine can also be beneficial for kidney stone disease prevention. The most common types of kidney stones are derived from calcium oxalate. Avila-Nava et al<sup>28</sup> evaluated dietary oxalate consumption in 400 Mexican adults with overweight and obesity using 24-hour dietary recalls and reported that the main foods with high oxalate content were raw spinach, huazontle (similar to amaranth), purslane, chard, almond, and toasted and sweetened roasted amaranth and that the highest antioxidant activity was found in strawberries, all types of chocolates, roselle, morita peppers, and pinolillo (a cacao-based and sweet cornmeal-based beverage). They reported that persons with overweight or obesity exceeded the dietary oxalate daily intake recommendation.<sup>28</sup>

Finally, culinary medicine should be considered to help patients navigate the ongoing pandemic. Mafra et al<sup>29</sup> presents a recommended diet and nutrition guide for patients with CKD under the coronavirus disease 2019 (COVID-19) pandemic. It is important to note that this and other suggested dietary recommendations<sup>30</sup> to prevent or manage COVID-19 infection in persons with kidney disorders are mostly opinion based and should be considered with caution until rigorously studied to examine whether nutritional interventions can have a bearing on COVID-19.

In summary, research continues to evolve on the importance of nutrition for disease management in patients with kidney disease, and new findings can further support culinary medicine as an important intervention because it can facilitate a more patient-centered approach. A one-size-fits-all approach to nutrition ignores the extreme complexity of patients with all stages of kidney disease and its complications.<sup>17</sup> This issue of the *Journal of Renal Nutrition* expands existing knowledge on the multitude of nutritional issues that affect patients with kidney disease and highlights the incredible importance of dietary counseling and medical nutrition in kidney disease management.

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