

Plant-based Protein Intake and Kidney Function in Diabetic Patients



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In 2012, Uribarri and Oh¹ in an editorial in *Kidney International* wrote, “The key to halting progression of CKD might be in the produce market, not in the pharmacy.” This editorial highlighted the interest of plant-based diet to reduce acidosis and, through this, the progression of chronic kidney disease (CKD).¹ In the nephrological literature, there is often an ambiguity between reduction of protein intake and vegetarian diet.

In fact, as historical cohort studies have shown, a vegetarian diet is not necessarily a low-protein diet.² A vegetarian diet has many benefits that combine reduction of the metabolic disorders of kidney failure, even its progression.³ It is now clearly demonstrated that the intake of animal protein, especially red meat and processed foods, has a deleterious effect on the renal function.⁴ Vegetarian diet pattern is associated with a reduced risk of diabetes.⁵ Vegetarian patients included in the cohorts have a

beneficial dietary profile but also often a lifestyle that negatively influences the risk for type 2 diabetes: lower body mass index, lower high blood pressure, more physical activity. In diabetic patients, does changing the diet for a diet in which animal protein is replaced by vegetable protein reduce the risk of developing kidney failure?

In this issue of *Kidney International Reports*, Oosterwijk *et al.*⁶ report the relationship between protein quality and the occurrence of renal failure in diabetic patients. Diabetes and Lifestyle Cohort Twente-1 (DIALECT-1) is a cohort of Dutch patients with type 2 diabetes. Dietary intake was assessed at the inclusion using a semi-quantitative food frequency questionnaire, validated for the Dutch population and modified for accurate assessment of protein sources. Renal function was assessed using CKD Epidemiology Collaboration formulae (estimated glomerular filtration rate). Medical information was collected associated with lifestyle and physical activity questionnaires. Multivariate Cox proportional hazard models were used and adjusted for the main

lifestyle and dietary factors. Patients were grouped according to tertiles of energy-adjusted protein intake. In addition, a theoretical replacement model was constructed to investigate the effect of replacement of one macronutrient by another, including source of protein, type of fat, or saccharides. Mean protein intake was 0.83 g/kg per day. Percentage of plant protein did not vary across the tertiles. Variation of protein intake was due to increase in animal protein across the tertiles. Among 420 patients, 99 patients with estimated glomerular filtration rate <60 ml/min were identified (23.6%). Lower percentage was found in the highest tertile of vegetable protein intake. In the multivariable model, higher vegetable protein intake was associated with lower prevalence of CKD (56% lower prevalence in the highest tertile). This association was confirmed when estimated glomerular filtration rate was analyzed as a continuous variable. The theoretical replacement model shows that replacing 3% of energy intake from animal by vegetable protein is associated with a significant reduction of the prevalence of CKD. Red meat is associated with a higher prevalence of impaired renal function.

A plant-based diet and/or a healthier diet has kidney-protective effects. There is now evidence from a large prospective cohort of patients with CKD or from vegetarians, DASH-diet, or Mediterranean diet cohort studies. Red and processed meat are associated with higher risk of CKD. Lower daily acid load is associated with better control of acidosis. Higher consumption of fruits and vegetables is associated with less inflammation and oxidative stress

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- Higher intake of whole-grain carbohydrates, fruits, vegetables, antioxidants, and alkaline food
- Higher fiber intake
- Lower phosphate absorption
- Lower red and processed meat intake

Figure 1. Expected benefits of a plant-based diet for chronic kidney disease patients.

(Figure 1). Lower phosphate load is due to the lower absorption from plant protein and lower additive phosphate from processed foods. Benefit of a vegetarian diet has been suggested in diabetic patients. Increased whole-grain products lead to a better control of glycemia in diabetic patients. Vegetarian diet improves insulin resistance in type-2 diabetes.⁷ Little is known in the real life. The ONTARGET (Ongoing Telmisartan Alone and in Combination with Ramipril Global Endpoint Trial) study suggested that increased vegetable intake could lead to a decrease in risk of CKD and mortality.⁸ The DIALECT-1 study demonstrated that in a large cohort

of diabetic patients, consuming a recommended amount of protein (0.8 g/kg per day), higher intake of vegetable protein could be associated with lower prevalence of CKD. Replacement of animal protein with vegetables protein reduces the risk for reduced renal function. As the authors suggest, it poses the question of recommended amount of protein in diabetic patients, which could be increased if it comes from plants.

This study confirms data from cohorts of nondiabetic patients. It is an observational cross-sectional study with all the defects related to this type of study. It must be confirmed by prospective studies in which diet, compliance, and the possible impact of protein intake should be better evaluated (fiber intake, inflammation, phosphate, and fibroblast growth factor 23).

DISCLOSURE

All the authors declared no competing interests.

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