NUTRITION IN HEMODIALYSIS PATIENTS

MEDigest

ISSUE #29: DECEMBER 2022

MALNUTRITION IN CKD: EPIDEMIOLOGY, PATHOPHYSIOLOGY AND OUTCOMES

In this section, we will define what is malnutrition among CKD patients. We will also introduce protein-energy wasting as an important manifestation of malnutrition in CKD. We will look at how common malnutrition is in CKD and dialysis patients and mention how it could be detrimental for our patients.

NUTRITIONAL ASSESSMENT AND INTERVENTION IN HD PATIENTS

We will discuss in this section how to assess the nutritional status of HD patients and highlight strategies to maintain nutrition among HD patients based on guideline recommendations. We will also present a recent study performed in China using the Body Composition Monitor to determine Malnutrition-inflammation score (MIS).

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FRESENIUS MEDICAL CARE

MALNUTRITION IN CKD: EPIDEMIOLOGY, PATHOPHYSIOLOGY AND OUTCOMES

Chronic kidney disease (CKD) increases risk for malnutrition, including protein energy wasting (PEW) and vitamin deficiency. Malnutrition, as defined by The American Society for Parenteral and Enteral Nutrition as "an imbalance between nutrient requirement and intake resulting in cumulative deficits of energy, protein or micronutrients that may negatively affect growth, development and other relevant outcomes", is prevalent in both developing and developed countries, and is an important risk factor for morbidity and mortality. [1] A systematic review and meta-analysis of 61 studies (N=21,119) demonstrated that the global prevalence of malnutrition associated with CKD was found to be ranging from 35.2–50.6% with higher prevalence among hemodialysis (HD) patients (43.1%) vs. CKD patients not requiring dialysis (38.5%). [2]

The International Society of Renal Nutrition and Metabolism (ISRNM) defines PEW as a "the state of decreased body stores of protein and energy fuels", and is associated with increased risk of cardiovascular disease, infection and death among CKD patients. [1] PEW is multifactorial and is associated with increased protein catabolism, decreased anabolism, chronic inflammation, metabolic acidosis and hormonal imbalances in CKD. [1] (Figure 1)

Nutritional problems in HD patients are also associated with albumin, amino acid and micronutrient losses from the dialysis treatment itself and the kidneys failing to eliminate excess water, salt, potassium and phosphates. [3]

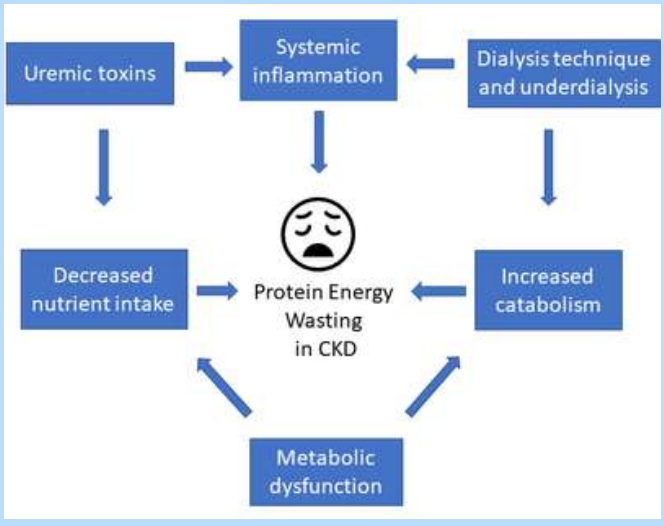
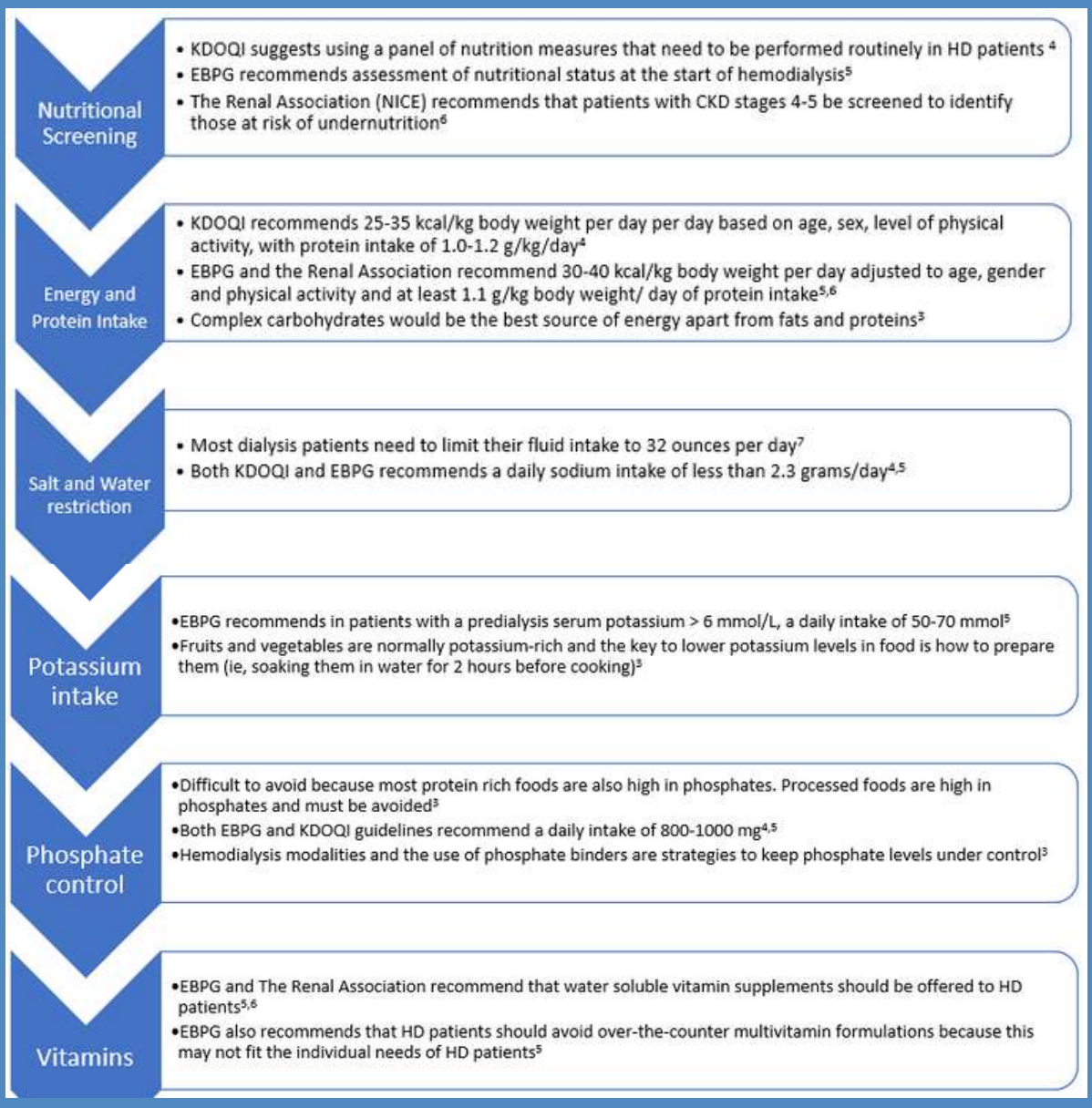


Figure 1. Schematic representation of the causes of protein energy wasting and pathophysiologic interactions in chronic kidney disease. Adapted from Front Pediatr 2018;6:161.

NUTRITIONAL ASSESSMENT AND INTERVENTION IN HD PATIENTS

The diagram below summarizes assessment tools and recommendations on energy and protein intake, salt and water restriction, potassium intake, phosphate control and guidance on vitamin supplementation based on KDOQI NKF (Kidney Disease Outcomes Quality Initiative, National Kidney Foundation) EBPG (European Best Practice Guidelines) and The Renal Association (NICE [National Institute for Health and Care Excellence] Recommendations).



HIGHLIGHT ON BODY COMPOSITION MONITOR (BCM)

The Utility of BCM in the Determination of Malnutrition-Inflammation Score (MIS): A study from China

A multicentre, observational cohort (N=1,591 HD patients) showed that a higher malnutrition-inflammation score (MIS) is associated with increased cognitive impairment (as a categorized variable, odds ratio [OR], 1.358; 95% confidence interval [CI], 1.010–1.825; p=0.045 and as a continuous variable, OR, 1.113; 95% CI, 1.053–1.178; p<0.001). MIS is a comprehensive tool for evaluation of malnutrition and is developed as a nutritional scoring system for dialysis patients and is associated with poor outcomes such as cardiovascular events, mortality and hospitalization. An important component of MIS assessment in the study employed the use of the Body Composition Monitor (BCM) for the assessment of fat stores, subcutaneous fats and signs of muscle wasting. Using BCM, MIS was shown to have positive correlation with OH (overhydration), extracellular water/intracellular water ratio (ECW/ICW), and had negative correlation with LTI (lean tissue index) (all values with p≤0.001). [8]

References:
(1) Iorember FM, *Front Pediatr* 2018;6:161; (2) Rashid I et al, *Clin Epidemiology Glob Health* 2021:100855; (3) Advanced Renal Education Program e-learning course "Good Nutritional Practices for Hemodialysis Patients" https://advancedrenaleducation.com/wparep/asiapacific/elearning/in-center-therapies/ [Accessed 29 December 2022]; (4) Ikizler TA et al, *Am J Kidney Dis* 2020;76(3)(suppl 1):S1-S107; (5) Fouque D et al, *Nephrol Dial Transplant* 2007;22(Suppl 2):ii45–ii87; (6) Wright M et al, *BMC Nephrol* 2019;20(1):370; (7) https://www.kidney.org/atoz/content/fluid-overload-dialysis-patient [Accessed 30 December 2022]; (8) Yang Y et al, *Kidney Blood Press Res* 2022;47:711–721.