

Chapter 73

Energy consumption, palmar grip strength and lean mass of hemodialysis patients

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1 INTRODUCTION

CKD is a complex disease with a significant impact on quality of life, longevity, use of medical resources and public health expenditures. Patients with CKD experience a drastic change in their lives, living with many limitations that include painful hemodialysis treatment, rigid diet therapy, changes in family, professional and social daily life and more frequent thinking in death, which leads the individual to have a negative perception about his health (SANTOS et al., 2019).

This is a public health problem with significant economic and social impact. In 1990, CKD represented the 17th leading cause of death in Brazil, while in 2010 it was ranked 10th. In addition, there was a significant increase in the contribution of CKD as a cause of premature death in Brazilian women. Hypertension and diabetes remain the main causes of CKD that cause kidney failure and the need for renal replacement therapy, which carries enormous burden on the health system (SANTOS et al., 2019). Dialysis treatment causes physical and emotional changes in patients, changes that also reflect in feeding, which is sometimes altered, causing changes in the nutritional status of the individual (MAHAN; ESCOTT-STUMP, 2005).

Hormonal changes, such as the inefficient synthesis of important hormones such as erythropoietin, changes mainly related to protein and energy metabolism and changes in food intake, caused mainly by vomiting, nausea and occurrences of the body's toxicity status, are causes of changes in nutritional status in patients. There is an association between caloric protein malnutrition in patients with cancer, relating the

causes and effects due to its high prevalence and close relationship with increased mortality (PLÁCIDO *et al.*, 2021)

2 PALMAR GRIP FORCE

Chronic kidney disease (CKD) consists of kidney injury and/or irreversible loss of kidney function, it has a high rate of morbidity and mortality, so CKD is considered a worldwide health problem (TEIXEIRA, *et al.*, 2015). Variations in nutritional status are frequent in patients with CKD, for this, there are several contributing factors, and these disorders corroborate the worsening of the quality of life of this population. Thus, it is necessary to evaluate the nutritional condition of these patients, especially for those who undergo some type of dialysis therapy (CARRERO *et al.*, 2013). For this evaluation, several methods can be used, among them stands out the palmar grip strength (PPF) that is characterized by detecting the loss of muscle mass quickly (DELL'OSBEL; ZANOTTI, 2018). PPF is a very well-appointed method because it is reliable, low cost and easy to understand. Due to the metabolic alterations present in the patients in question, PPF may undergo variations, this is due to the characteristic of CKD. In addition, symptoms such as fatigue and changes in supply and hydroelectrolytic changes may contribute to the oscillation of PPF (MACDONALD, *et al.*, 2012). As CKD progresses, dialysis patients are more susceptible to changes in nutritional status (EN) and dietary status, mainly due to disease and treatment. They generally show a decline in protein intake or also due to imposed dietary restrictions (DOBNER *et al.*, 2014; MARTINS; MOREIRA, MOREIRA, AVESANI, 2015). Thus, oral supplementation is necessary in order to avoid major complications and changes in THE in dialysis patients.

3 LEAN MASS

Lean mass refers to an anthropometric measure, which is related to the part of the human body that is not formed by fat. Chronic kidney disease affects the structure and function of the kidney, and may present varying severity and diagnoses (BRASIL, 2014). Patients who undergo hemodialysis have a compromise of their health and nutritional status, developing major nutritional problems that affect the patient's quality of life. Patients who undergo hemodialysis end up having an impairment of their nutritional status (WILKENS; Juneja, JUNEJA, SHANAMAN, 2012). Given the nutritional impairment of these patients, it is important to follow up a nutrition professional, in order to perform the correct supplementation and assessment of their nutritional status. It is noted that supplementation and adequate feeding in dialysis patients are very important (COSTA *et al.*, 2020). Thus, by increasing energy and protein intake there is a significant increase in lean mass (RIELLA; MARTINS, 2013). Counseling and guidance given to patients undergoing hemodialysis are necessary because it helps control the anthropometric measurements of the clients.

4 KILOCALITIES CONSUMED THROUGH SUPPLEMENTATION IN HEMODIALYSIS SESSIONS

Energia derives from the Greek *ergon*, and means the ability to perform work. As for the metabolic process, energy is indispensable for the realization of cellular chemical reactions, among which the maintenance of body temperature (PHILIPPI; AQUINO, 2017). Also according to these authors, calorie (*lime*) is the amount of chemical energy needed to raise the temperature of one gram of water from 14.5 to 15.5°C. Calorie is the "lowest" unit, also called kilocalorie (*kcal*), is the representation of the energy produced by food equivalent to 1000 calories (PHILIPPI; AQUINO, 2017). In the Consumer Guidance Manual (2001), the National Health Surveillance Agency points out that calories are calculated from the amount of fats, proteins and carbohydrates present in food, which are dependent on factors such as the amount of daily physical activity, age, weight, and functioning of each person's body, and can be on average 1600 kcal if it is an adult woman who is not practicing physical activity or a person of third age; if you are a child, adolescent girl or adult man who does not do any kind of physical activity, the ideal is to consume about 2200 kcal a day; however, if this is the case of a adolescent boy or an adult man who does physical activity, the average daily consumption is 2800 kcal (BRASIL, 2001).

The amount of kilocalories consumed is widely used in the evaluation of dialysis patients since the progressive loss of renal function in patients with chronic kidney disease (CKD) is associated with several complications (e.g., cardiovascular diseases, anemia, hyperparathyroidism, inflammation, metabolic acidosis, malnutrition and protein-energy depletion [DEP]) (RIELLA; MARTINS, 2013) making them an important metric for nutritional assessment (BRASIL, 2016) since in these patients nutritional alterations are observed more frequently at a more advanced stage of CKD (RIELLA; MARTINS, 2013).

Evidence indicates that nutritional decline begins even when the reduction in glomerular filtration rate is modest, and it is likely that the observed decrease in protein and energy intake in the diet plays an important role (MEHROTRA; KOPPLE, 2001). Patients requiring hemodialysis therapy are subject to increased protein-caloric loss, which significantly increases morbidity and mortality rates. In peritoneal dialysis (PD), malnutrition is also easily found, but it is different from hemodialysis (HD) that has as its main problem the caloric depletion (RIELLA; MARTINS, 2013).

To supply this caloric depletion, patients use nutritional supplementation to improve nutritional status. Evidence indicates that oral supplementation in patients with peritoneal dialysis, hemodialysis and predialysis showed an improvement in quality of life and nutritional status confirmed mainly by improvement in serum albumin and prealbumin levels (VARGAS; ROEL, 2020). Patients in hypercaloric oral supplementation of 50 ml, which corresponds to the increase of 225 kcal during hemodialysis sessions that lasted 6 months, obtained the confirmation of 5 of the 7 nutritional parameters that were evaluated. The use of oral supplementation had a positive effect on the improvement of the nutritional status of these patients (ALENCAR *et al.*, 2013).

5 FINAL CONSIDERATIONS

Patients with chronic kidney disease on hemodialysis present worsening of nutritional status, loss of lean mass and decreased palmar grip strength, as well as risk of malnutrition due to protein loss of treatment and lower food acceptance. Oral nutritional supplementation can help in the recovery of the nutritional status of these patients.

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