

POTASSIUM ANALYSIS IN THE DIET OF HOSPITALIZED PATIENTS WITH KIDNEY DISEASE

ANÁLISE DE POTÁSSIO NA DIETA DE PACIENTES INTERNADOS COM DOENÇA RENAL

ANÁLISIS DE POTASIO EN LA DIETA DE PACIENTES HOSPITALIZADOS CON ENFERMEDAD RENAL

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ABSTRACT

To analyze the nutritional composition of menus provided to kidney patients in a hospital institution. Analytical, cross-sectional study with a quantitative approach in the period November and December 2023. The foods that make up the standard diet were quantitatively analyzed, subsequently the fruits from the contracted menu were analyzed separately, as well as the foods with the highest potassium supply. As a result, new menu models were proposed. 2720 mg of potassium were found in the standard menu. With the new menu proposals, a reduction of 1000 mg of potassium/day of meal, 650 mg of phosphorus and an improvement in protein quality was observed. The analysis made it possible to adapt the supply of potassium and expand the menu possibilities in order to promote individuality and improve the patient's experience during hospitalization.

Keywords: *Kidney Disease; Potassium in the Diet; Diet Therapy.*

RESUMO

Analisar a composição nutricional dos cardápios fornecidos para pacientes renais de uma instituição hospitalar. Estudo analítico, transversal com abordagem quantitativa, realizado no período de novembro a dezembro de 2023. Foram analisados quantitativamente os alimentos que compõem a dieta padrão; posteriormente, foram analisadas isoladamente as frutas do cardápio contratado, assim como os alimentos com maior oferta de potássio. Com isso, foram propostos novos modelos de cardápio. Foram encontrados 2720 mg de potássio no cardápio padrão. Com as novas propostas de cardápio, observou-se uma redução de 1000 mg de potássio/dia da refeição, 650 mg de fósforo e melhora da qualidade proteica. A análise possibilitou adequar a oferta de potássio e ampliar as possibilidades de cardápio, a fim de promover a individualização e melhorar a experiência do paciente durante a internação.

Descritores: *Doença Renal; Potássio na Dieta; Dietoterapia.*

RESUMEN

Analizar la composición nutricional de los menús brindados a pacientes renales en una institución hospitalaria. Estudio analítico, transversal con enfoque cuantitativo en el periodo noviembre y diciembre de 2023. Se analizaron cuantitativamente los alimentos que componen la dieta estándar, posteriormente se analizaron por separado las frutas del menú contratado, así como los alimentos con mayor aporte de potasio. Como resultado, se propusieron nuevos modelos de menú. Se encontraron 2720 mg de potasio en el menú estándar. Con las nuevas propuestas de menú se observó una reducción de 1.000 mg de potasio/día de comida, 650 mg de fósforo y una mejora en la calidad de las proteínas. El análisis permitió adaptar el aporte de potasio y ampliar las posibilidades del menú con el fin de promover la individualidad y mejorar la experiencia del paciente durante la hospitalización.

Descriptores: *Enfermedad Renal; Potasio en la Dieta; Dietoterapia.*

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INTRODUCTION

Kidney disease can be chronically prolonged or have an abrupt onset acutely. It is characterized by the reduction or inability of the kidneys to perform their essential activities. It can appear asymptotically or with symptoms, requiring immediate treatment in both cases^{1,2}.

It is estimated that approximately 850 million people worldwide have kidney disease, affecting one in five men and one in four women, aged 65 to 74 years, and about 50% of individuals over 75 years of age will develop some kidney disease³.

Treatment can be carried out through medications, lifestyle changes, with an emphasis on healthy eating and, in more severe cases, replacement therapy. Renal replacement therapy is required when the glomerular filtration rate declines to critical levels, requiring dialysis or kidney transplantation. The most commonly applied dialysis categories are hemodialysis and peritoneal dialysis⁴. Brazil has one of the largest populations on dialysis. It is estimated that there are currently more than 140,000 patients on dialysis, of which about 93% are on hemodialysis and 7% are on peritoneal dialysis⁵.

Hemodialysis is a machine that performs the function of the kidneys in the body, being responsible for the elimination of toxic and liquid substances, maintaining the acidobase and hydroelectrolyte contents in homeostasis. However, it should be considered that this function is only performed at the time of hemodialysis and, after that, the patient needs to be constantly monitored for electrolytes that are difficult to eliminate by the kidneys⁶.

The electrolyte that causes one of the most serious hydroelectrolyte alterations, which tends to accumulate due to the difficulty of excretion, is potassium. This alteration is called hypercalcemia, which occurs when the serum potassium concentration is above 5.5 mEq/L. Its increase originates from several mechanisms, such as the use of potassium-sparing drugs, the presence of catabolism, insulin resistance, metabolic acidosis, intestinal constipation, and ingestion of potassium-rich foods⁷.

Increased serum potassium has the potential to lead to excessive itching, extra-articular and coronary artery calcifications, ischemic heart disease, arrhythmias, cardiac arrest, and sudden death. Thus, as a form of treatment and prevention of hyperkalemia, a nutritional approach with emphasis on a low-potassium diet is important⁸.

In some cases, the treatment of chronic kidney patients requires hospitalization and medical and hospital care, including nutritional care related to macro and micronutrient intake. Currently, there are a variety of nutritional references on the dietary supply of this nutrient for patients with chronic kidney disease, whether on conservative or dialysis⁹.

The diets provided in the hospital environment should be in accordance with the clinical status, pathophysiological picture and specificities of the disease and the individual, however, due to the standardization of menus and the limitation of options for adjustments, most patients do not have their nutritional needs individualized according to the stage of the pathology in which they are. even with follow-up and daily visits from a professional nutritionist⁹.

Currently, at the Dr. Waldemar Alcântara State Hospital, a secondary hospital located in the capital of the State of Ceará, an average of 750 hemodialysis sessions are

performed for adult patients per month. As a result, in April 2023, the State Government authorized the expansion of 21 beds directed to the care of this patient profile.

The kitchen of this institution is managed by an outsourced service, which has in its contract only a standardized menu model for the dialysis patient, varying the consistency between general, mild, pasty and liquid, which is based on milk preparations in three meals and the offer of fruits, which include papaya. These characteristics are in disagreement with what is recommended by the Brazilian Society of Nephrology (2020), which recommends a 50% reduction in the consumption of milk and dairy products and meat, in addition to classifying papaya as a fruit with a high potassium content ².

Thus, the aim of this study is to analyze the nutritional composition of the menus provided to renal patients in a hospital institution.

METHODS

An analytical, cross-sectional study with a quantitative approach was conducted from November to December 2023. Developed in a hospital institution, located in the capital of the State of Ceará, with a secondary level of care, financed by the Unified Health System - SUS, linked to the State Health Department and managed by a non-profit Social Health Organization - OSS.

In order to define the consistency of the standardized diet for renal patients on dialysis, the incidence criterion was established. As a result, the diet chosen was the bland consistency. For this purpose, the Brazilian Table of Food Composition (TACO) was used 2023, in the spreadsheet version of the *Microsoft Excel*®, imported from the version *Online*. The food was released in grams or milliliters, according to the composition, and per capita, contracted in the standard menu chosen.

The quantitative analysis was divided into four stages. Initially, all the foods that made up the soft dialysis diet were launched in the TACO to enable the visualization of the caloric supply and the macro and micronutrients of the standard composition. Then, in order to know the supply of potassium from the fruits available at the institution, the composition of these fruits was analyzed separately for later ranking.

Next, in order to know which foods provided a higher amount of potassium per capita used in the total composition of the standard menu, a filter with a cut-off point of 100 mg of potassium was applied¹⁰.

Finally, several adjustments were suggested for products with higher potassium intake, such as reduction and substitution of dairy preparations, per capita reduction of proteins in main meals, exclusion and redistribution of fruit intake, and inclusion of a specific supplement for patients undergoing substitution treatment. As a result, new analyses were carried out and three new menu compositions were defined for renal dialysis patients, adjustable to different clinical moments.

With regard to ethical issues, the research was submitted to the institution's internal research committee, with the release of the letter of consent, and was dismissed by the ethics committee because it did not involve human beings.

RESULTS

The composition of the standardized menu for dialysis patients in the researched institution has as a general characteristic the offer of 600ml of milk distributed in three preparations for breakfast (coffee with milk), afternoon snack (vitamin) and supper (porridge). The main meals consist of 190g of protein, derived from chicken or fish, 140g for lunch and 50g for dinner, in addition to two fruit offerings throughout the day; Among them, papaya, tangerine, apple, pineapple or watermelon and a pulp juice as a morning snack.

The sample used in this study was based on the standardized menu for renal dialysis patients in the bland consistency and found the following characteristics: 2200 calories, 88 grams of protein, 1667 mg of phosphorus and 2720 mg of potassium.

Regarding the supply of potassium by the fruits contracted at the institution, a relevant factor observed was the amount of this nutrient found in papaya, one of the fruits that is currently part of the menu, which has 333 mg of potassium per capita of 150g, a supply higher than that of melon, which is contraindicated for renal patients, as can be seen in Table 1.

Table 01: Analysis of the potassium supply of fruits on the menu for kidney at HGWA, Fortaleza 2023.

Food	per capita (g)	K(mg)
Banana, apple, raw*	150	396,00
Papaya, Taiwan, raw	150	333,00
Melon, raw*	150	324,00
Tangerine, Poncã, raw	200	262,00
Watermelon, raw	250	260,00
Pineapple, raw	150	196,50
Apple, Fuji, raw	130	97,5

*They are not part of the menu for kidney patients.

Source: the institution's own database and TACO 2023 table.

It was observed that the highest potassium contents of the menu correspond to milk-based preparations, served in 3 menu preparations, equivalent to a total of 839.06 mg. Analyzing the potassium content found in the protein source, currently distributed in 140 g at lunch and 50 g at dinner, a value of 319.90 mg of potassium was found. Another item that drew attention was the carrot, which offers 184.80 mg of potassium in the current per capita, and again papaya in a prominent place as a source of high potassium supply. These data can be seen in Table 2.

Table 02: Foods with a supply equal to or greater than 100 mg of potassium per capita by HGWA, Fortaleza 2023.

Food	per capita (g/ml)	K (mg)
Coffee, infusion 10%	100	156,00
Carrot, boiled	150	184,80
Chicken, breast, skinless, cooked	50	115,50
Milk, cow's, whole	350	465,50
Milk, cow's, whole, powder	33	373,56
Papaya, Taiwan, raw	150	333,00
Watermelon, raw	250	260,00
Abbey, fillet, frozen, boiled	140	204,00

Source: the institution's own database and TACO 2023 table.

With the new proposed changes in the menu, there was a reduction of approximately 1000 mg of potassium/day of the meal, from 2720 mg to 1714.59 mg and a reduction of approximately 650 mg of phosphorus/day, from 1667 mg to 1014 mg/day, with variations in protein intake, as shown in Table 03. Chart 01 shows the composition of the menus proposed per meal.

It is important to emphasize that the final analysis was carried out with fruits with lower potassium supply, so the level of this mineral was restricted below the recommended, but possible variations should be taken into account, such as the alternation of these fruits with others with moderate supply, such as watermelon and tangerine, slightly raising potassium levels from 1714 mg to 1955 mg. but still within the recommended range.

Table 03: Nutritional analysis of the new compositions of the menu for dialysis patients at HGWA, Fortaleza 2023.

Proposal	Calorie	Protein	P (mg)	K (mg)
Proposal 1: - Reduction of the per capita milk to 200ml/d, limited to one meal a day, and replacement of the other two preparations with low-K fruit, with the possibility of adding 30g of salty biscuits; - Exclusion of papaya from fruit offerings; - Replace the fruit that made up the lunch dessert with 80ml of diet gelatin; - Reduction to 140g total white protein at lunch and dinner	2.057,79	71,80	1014,00	1714,59

- Inclusion of one unit of hard-boiled egg in the day.				
Proposal 2: - Similar to proposal 1 with the replacement of one of the snacks (fruit + biscuit) with a specific supplement with low K content.	2.141,80	85,42	1.128,10	1653,79
Proposal 3: - Similar to proposal 1; - Increase to 210g total white protein at lunch and dinner. NOTE: variation without and with the egg	2.085,49/ 2.166,15	85,87 / 93,85	1.060,40 / 1.170,80	1792,89 / 1876,29

Source: the institution's own database and TACO 2023 table.

Chart 01: Proposals for menus for dialysis patients hospitalized at HGWA and their indications. Fortaleza, 2023.

PROPOSAL	BREAKFAST	SNACK	LUNCH	SNACK	DINNER	SUPPER
Proposal 1	100ml infusion coffee, 200ml whole milk, 50g hot-dog bread, 5g margarine, 150g pineapple	200 ml pulp juice + 1 hard-boiled egg	Warm with 70g of cooked fish, 175g of cooked white rice, 100g of cooked pasta, 80g of cooked salad, 80ml of diet gelatin	130 g apple	Same as lunch, minus the gelatin	Pineapple + 30 g salted biscuit
Indication	First option to choose. Eutrophic patient or with a need for up to 70g of protein/day, WITH severe water restriction of up to 600ml/d					
Proposal 2	Menu same as proposal 1*					200 ml of specific supplement with low K content
Indication	Patient preferably malnourished, with a need for up to 85 g of protein/day, with greater K restriction.					
Proposal 3	*		Warm with 140g of white protein	*		
Indication	Patient with protein requirement of up to 94 g/day, refusal of specific supplementation and/or refusal of egg.					

Source: Prepared by the authors.

DISCUSSION

Chronic non-communicable diseases, such as Chronic Kidney Disease (CKD), represent costs for the health system, since they are responsible for a significant portion of hospitalizations and hospital interventions¹¹. In the case of CKD, an adequate and healthy diet contributes to the treatment and prevention of complications.

The main form of treatment for one of the electrolyte disturbances in CKD, hyperkalemia, is through dietary therapy, avoiding foods rich in potassium, such as avocado, plantain, plantain, fig, orange, passion fruit, melon, tangerine, grape, papaya, guava, kiwi, beans, chocolate, tomato paste¹². When restriction is indicated, a primary aspect is to avoid ultra-processed foods that contain potassium additives, as these can increase their content in food by up to 20%¹³.

Although some referrals indicate maintaining serum potassium levels within the normal range, for patients in stages 3-5 of the disease or for post-transplant recipients¹⁴, its dietary intake should vary according to serum levels and common changes in CKD, both for dialysis patients and for those on conservative treatment, particularly in those with tubular disorders and low GFR, less than 30 ml/min/1.73 m², adjusting the intake to values below 3000 mg/day^{13,15,16}.

The menu analysis of the bland and general standardized diets of a hospital institution found an amount of potassium that ranged from 2160.71 mg to 3597.58 mg during the study period, associated with the availability of food sources such as fruits, vegetables and legumes, dairy products and meats¹⁷. However, for patients with CKD, hospital units usually change the standard to follow the established recommendations for the pathology.

It is important to know the chemical and nutritional composition of hospital oral diets for patients with CKD, as this is the standardized menu prescription that will be offered during most of the hospitalization concomitant with clinical treatment¹⁸. The availability of this information in hospital protocols facilitates the dietary prescription in the routine of nutritionists, as well as helps them to individualize the menu, respecting nutritional recommendations.

The analysis of the standardized menu for patients with chronic kidney disease used by the institution allowed the identification of the main sources with medium to high potassium content, considering the margin of 100 - 350 mg/100 g of food¹⁰, such as coffee, carrots, boiled chicken breast, whole cow's milk, papaya, watermelon, and boiled beef fillet. Considering that vegetables, fruits, legumes and animal protein sources are the main sources of potassium, the selection of those with lower potassium levels and the method of preparation are important nutritional strategies to avoid hyperkalemia¹⁸.

The purpose of the present study was to change the supply of certain foods, aiming to reduce the amount of potassium in the menu. After making adjustments, the variation in the amount of potassium in the menus was between 1653.79 mg and 1876.29 mg, values consistent with the recommendations in the literature.

In a protocol of a hospital institution, the protein portion for dialysis patients was established at 80 g for lunch and 100 g for dinner, and a total of 2312.69 mg of potassium was identified, with more than one serving of dairy products per day¹⁹. Another protocol includes a menu for CKD on dialysis with 105 g of protein at lunch and 70 g at dinner,

reaching 2148 mg of potassium, with one serving of dairy products per day²⁰. The values achieved in the proposals of this study are below the values found in other protocols, despite the similarity in the protein and dairy portions.

Regarding fruits, all institutional protocols reviewed suggest the same pattern, considering a greater supply of fruits with medium to low potassium content (between 0-200mg/100g)^{19,20,21,22}.

CONCLUSION

The analysis of the nutritional composition of the oral diet provided to renal patients contributed to the correction of the composition of the menu and a reduction of approximately 1000 mg of potassium/day, bringing safety to the hospitalized dialysis patient. In addition, it was possible to expand the menu adjustments according to the patient's protein needs, in order to promote individuality and improve the patient's experience during the hospitalization period. It is important that further studies be developed in order to monitor the clinical impact of the application of the menus proposed in this research.

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