Nutritional profile of hemodialysis patients concerning treatment time

Análise do perfil nutricional de pacientes renais crônicos em hemodiálise em relação ao tempo de tratamento

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Abstract

Introduction: The mortality of the population with chronic kidney disease (CKD) on hemodialysis (HD) is very high and the protein-energy malnutrition stands out as one of the most common consequences in relation to this condition. **Objective:** To evaluate the association between time of hemodialysis and nutritional parameters of patients. **Methods:** It is a cross-sectional study with secondary data, developed of the University Hospital of the Federal University of Juiz de Fora (HU/UFJF). This study was approved by the Research Ethics Committee (Nº 1.233.142), a total of 36 patients. The medical records and collected data were analyzed for anthropometric markers, biochemical and diet, considering two groups: HD time less than three and greater than or equal to three years. **Results:** There was reduction of mass of somatic protein with increased duration of HD. In relation to food intake was observed that in patients with increased duration of dialysis, an increase in average consumption of protein / kg of weight, calories, phosphorus and potassium, with a significant difference from the mean protein intake / kg ($p = 0.04$) and phosphorus ($p = 0.045$). Increasing HD time has altered body composition of patients, indicating a decline in the nutritional status of these individuals. **Conclusion:** HD patients are a risk group for protein-energy malnutrition, where HD time interferes with the nutritional status and food profile of the patient. The group HD time greater than or equal to 3 years presented worsening nutritional status.

Keywords: renal dialysis; nutritional status; protein malnutrition; renal insufficiency; nutrition assessment.

Resumo

Introdução: Pacientes com doença renal crônica em hemodiálise (HD) apresentam risco elevado para mortalidade, sendo que a desnutrição protéico-energética se destaca como uma das causa mais comuns em relação a essa condição. **Objetivo:** Avaliar a associação entre o tempo de hemodiálise e parâmetros nutricionais dos pacientes. **Métodos:** É um estudo transversal com dados secundários, desenvolvido no Hospital Universitário Federal Universidade de Juiz de Fora (HU / UFJF). Este estudo foi aprovado pela pesquisa Comitê de Ética (nº 1.233.142), um Total de 36 pacientes. Os dados foram coletados por meio dos prontuários médicos, os quais foram analisados marcadores antropométricos, bioquímicos e dieta, considerando dois grupos: tempo HD menor do que três anos e tempo de HD maior ou igual atrês anos. **Resultados:** Houve redução de massa de proteína somática com aumento do tempo em HD. Em relação à avaliação alimentar, observou-se que em pacientes com maior tempo em diálise houve aumento no consumo médio de proteína/kg de peso, calorias, fósforo e Potássio, com diferença significativa da ingestão média de proteína/kg ($p = 0,04$) e fósforo ($p = 0,045$). O tempo em HD alterou a composição corporal dos pacientes, indicando um declínio doestado nutricional desses indivíduos. **Conclusão:** Pacientes com HD são um grupo de risco para desnutrição protéico-energética, onde o tempo em HD interfere no perfil antropométrico e alimentar do paciente.O grupo com tempo de HD superior ou igual a 3 anos apresentou piora do estado nutricional.

Palavras-chave: diálise renal; estado nutricional; desnutrição proteica; insuficiência renal; avaliação nutricional.

Introduction

In Brazil, the estimated number of dialysis patients in 2014 was 112,004, of which 91.4% underwent hemodialysis (HD).[1] These patients, on average, were treated for 3 years,[2] reaching 22 years in HD.[3]

The mortality of the population with chronic kidney disease (CKD) in HD is high and the protein-energy malnutrition (PEM) stands out as one of the most common consequences.[4] Most patients have inadequate energy, protein and nutrient intakes, which compromises their nutritional statuses.[3,5] In addition, the risk of PEM is inherent to the hemodialysis process and may worsen as the time in HD increases.[2,6]

Considering the prevalence of nutritional disorders in this population and its correlation with the clinical prognosis, it is necessary to have them undergo a nutritional diagnosis.[5] It is important to study the relationship between the duration of the HD treatment and its impact on the nutritional status, since it can more effectively push for more effective interventions to improve their quality of life.[7]

Therefore, the objective of this study was to evaluate the association between HD duration and the nutritional parameters of these patients.

Methods

This is a cross-sectional study, carried out at the University Hospital of the Federal University of Juiz de Fora (HU/UFJF). Thirty-six patients were analyzed through their medical records, whose inclusion criteria were: records of individuals aged 18 years or older and HD duration equal to or greater than six months. The medical records of patients with infectious diseases, liver diseases and heart diseases were excluded. This study was approved by the Research Ethics Committee (nº 1,233,142).

The anthropometric evaluation was performed monthly by the Nutrition Team, post HD. Information on dry body weight, height, Body Mass Index (BMI) were collected; arm muscle area (AMA); arm muscle circumference (AMC); tricipital skinfold (TSF); arm circumference (AC) and waist circumference (WC). The BMI classification was performed for adults and the elderly, according to recommendations from the World Health Organization (WHO)[8] and Lipschitz,[9] respectively.

WC was used to classify the risk of cardiovascular diseases (CVD), according to the WHO, with cut-off points (1997) - men ≥ 90 cm and women ≥ 80 cm. The Frisancho tables were used for the classification of the skinfolds and AC.[10]

For the analysis of food consumption, we collected food recall data of 24h. The energy consumption of macronutrients and micronutrients were calculated by the DietWin® software. Dietary intake adequacy was assessed according to specific standards for patients with CKD.[4]

Laboratory tests were performed according to the Clinical Guidelines for patients with CKD:[11] albumin (≥ 4 mg/dL), phosphorus-P (3.5 to 5.5 mg/dL), potassium-K (3.5 to 5, 5 mEq/L), calcium-Ca (8.4 to 10.2 mg/dLmg) and kt/v (≥ 1.2).

Statistical analyzes were performed using the SPSS 23.0 software. The sample was divided into two groups: time in HD < 3 years; and ≥ 3 years. To verify the normality, we used the Shapiro Wilk test, and for comparisons of the variables between the two groups, the Student's *T* test. The level of significance was set at less than 5% ($p < 0.05$).

Results

The sample of 36 people consisted of a predominantly male population (55.6%), with a mean age of 59.57 ± 13.68 years, 44.4% of whom were elderly. The mean HD time was 6.64 ± 5.85 years.

In relation to the nutritional status, according to BMI, we found a mean of 25.2 ± 4.28 kg/m² (adult 24.57 ± 5.09 kg/m², aged 25.71 ± 3.57 kg/m²), with 38.9% being overweight and 11.1% underweight. When analyzing the results of AMA, TSF and AC, we found that 22.3% presented with subcutaneous adipose tissue depletion and 58.4% depletion of somatic protein mass. The mean WC was 87.23 ± 12.27 cm, and 44.4% of the participants had a high or very high degree of CVD risk.

The mean serum albumin was 3.83 ± 0.28 g/dL and 6.7% of the subjects had mild depletion of this marker. The mean kt/v was 1.55 ± 0.43, with 16.7% below the reference value. The mean values of K, P and Ca were 5.57 ± 0.7 mEq/L, 5.16 ± 1.54 mg/dL and 8.89 ± 0.82 mg/dL, respectively, indicating values above the recommendation for K.

The mean caloric intake was 1280.37 ± 556.16 Kcal/day (20.52 ± 11.74 Kcal/kg/day). Macro and micronutrient analyses indicated reduced protein consumption, with an average of 0.87 ± 0.50 g/kg. P 647.42 ± 357.20 mg; K 1433.47 ± 565.66 mg and Ca 269.3 ± 309.95 mg.

Table 1 shows the relationship between the means of anthropometric, biochemical and dietary markers according to the time in HD, considering two groups: HD time < 3 years and ≥ 3 years. Considering the time in HD, there was a decrease in the somatic protein mass with the increase of time in HD. Regarding dietary characteristics, we found that in the group of patients with longer time in HD there was an increase in the average protein/kg of body weight, calories, *p* and K, with $p = 0.04$ in relation to the mean intake of proteins/kg of body weight and phosphorus $p = 0.045$.

Discussion

Body composition measurements tend to decrease with increasing time in HD, concluding that prolonged HD is associated with a significant decline in nutritional parameters.[6]

In the present study, low weight, according to BMI, was observed in 11.10% of the patients, similar to the study conducted in Maringá (PR), 2008,[4] with 12.90% ($p < 0.05$). The mean percentages of CMB and AMB were below the normal range, suggesting a reduction in lean mass and worsening of nutritional status after 3 years of treatment.

HD patients are susceptible to PEM due to several factors, including insufficient dietary intake.[3] In the population of this study, caloric and protein food intake fell below nutritional recommendations, including those in the risk groups for PEM. A similar result was found in a study carried out in Porto Alegre (RS),[12] in which energy intake and daily protein intake were below the recommended level, around 28 ± 10 kcal/kg/day and 1.1 ± 0.4 g ptn/kg, respectively.

In a study conducted in the city of Guarulhos (SP), in 2013,[13] from a 3-day food registry, mean energy, protein, phosphorus and potassium consumptions were found to be lower than the established recommendations, as well as in the present study. However, in relation to nutritional status, this study indicated, by BMI, that most patients presented adequate body weight,[13] differently from the data found here.

Biochemical parameters are used to evaluate nutritional status as a complementary evaluation.[13] In

Table 1 Average and standard deviation of anthropometric, biochemical and dietaryc markers, according to time in dialysis, of 36 hemodialytic patients from a hemodialysis center of the University Hospital of Juiz de Fora (MG)

Variables	Mean HD duration times HD < 3 years (n = 11)	Mean times in HD > 3 years (n = 25)	*p*
Anthropometrical Assessment			
BMI	26.89 ± 4.12kg/m²	24.46 ± 4.22 kg/m²	0.121
AC	27.90 ± 3.53 cm	25.52 ± 3.05 cm	0.069
TSF	22.91 ± 10.62 mm	21.88 ± 10.26 mm	0.790
AMC	20.71 ± 2.13 cm	18.64 ± 2.73 cm	0.022*
AMA	34.49 ±7.17 cm²	28.26 ± 8.64 cm²	0.034*
WC	92.09 ± 12.44 cm	85.10 ± 11.81 cm	0.132
24-hour recall			
Kcal Total	1118.22 ± 643.48 kcal	1351.75 ± 511.16 kcal	0.303
PTN/kg	0.64 ± 0.36 g/kg	0.98 ± 0.53 g/kg	0.040*
Phosphorus	7.32 ± 5.23 mg	11.63 ± 6.43 mg	0.045*
Potassium	1332.39 ±764.88 mg	1477.95 ±464.89 mg	0.568
Calcium	388.12 ± 401.44 mg	376.25 ± 270.01 mg	0.930
Biochemical tests *			
Albumin	3.82 ± 0.14 mg/dL	3.83 ± 0.32 mg/dL	0.899
Phosphorus	4.92 ± 1.43 mg/dL	5.26 ± 1.61 mg/dL	0.569
Potassium	5.38 ± 0.84 mEq/L	5.65 ± 0.65 mEq/L	0.419
Calcium	8.65 ± 0.65 mg/dL	8.99 ± 0.87 mg/dL	0.257
Kt/v	1.32 ± 0.41	1.65 ± 0.41	0.061

*$p < 0,05$. BMI: body mass index. AC: Arm Circumference. TSF: Triceps skin fold. AMC: Arm Muscle Circumference. AMA: Arm Muscle Area. WC: Waist Circumference. # 6 did not undergo biochemical assessment, 2 subjects from the "Time in HD < 3years" Group.

relation to these, the present study did not reveal significant alterations between the two groups compared. Serum albumin was found to be below the reference value in both groups of patients, and it may indicate weakened nutritional status.

Serum albumin has been the parameter most commonly used as a nutritional status marker for patients in HD, because EPM causes a decrease in albumin synthesis. However, this plasma protein should not be used as a single criterion for this purpose, since several factors such as age, comorbidities, hypervolemia and body losses can influence its serum concentrations.[14]

Kt/V is a method for analyzing the efficiency of dialysis. When this marker is lower than expected, it is necessary to be aware of the increase in nutritional risk and mortality.[6] In this study, Kt/V values were adequate in both groups, and even better in the group after 3 years of HD. However, this improvement was not statistically significance between the groups, but it was found related to a longer life expectancy.

Anthropometric parameters change faster than biochemical and dietary parameters. Since HD is a catabolic event resulting from inflammation, secondary hyperparathyroidism, metabolic acidosis and nutrient losses for the dialysis bath, it is common for HD patients to present changes in anthropometric measures, especially if food consumption is not recommended for the patient. Biochemical and dietary results may require more time to express statistically significant changes.

Regarding the methods of anthropometric analysis, the study, in addition to using BMI measurements, used other anthropometric variables, showing to be more accurate for this analysis, since BMI does not tell the level of muscle loss.

In the literature, the discussion about the relationship between HD time and altered nutritional status is still incipient, assigning importance to the data presented in this paper. HD contributes to the nutritional depletion of the patient over time, therefore, nutritional monitoring is paramount.

The present study presented limitations in relation to the non-application of the 3-day Food Registry, since this type of food survey may represent a better habitual intake of the population, when compared to the 24-hour Food Recall, although the latter was adopted by the hospital and is a good tool in clinical practice.[13]

Conclusion

It is concluded that patients in HD are a risk group for EPM, since they presented an inadequate feeding in relation to the nutritional recommendations. The increase of time in HD contributed to the depletion of muscular mass, which indicates nutritional status worsening.

Therefore, it can be emphasized that nutritional monitoring is indispensable for maintaining a good nutritional status, considering the time in HD.

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