Effects of customary dinner on dietetical profile of patients undergoing hemodialisys

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ABSTRACT

Introduction: To assess the effects of the habit of having evening dinner on the dietary macro- and micronutrient profile of chronic kidney failure patients on hemodialysis. **Methods:** Cross-sectional study carried out at a dialysis clinic at the city of Belo Horizonte, state of Minas Gerais. The study comprised 90 patients undergoing hemodialysis. Personal, clinical, and dietary (three-day food record) data were collected. The habit of having dinner was considered as having a complete evening meal, and the lack of that habit was considered as not having it or replacing it by a fast meal. The amounts of nutrient intake were estimated in the specific software Dietwin®. **Results:** The carbohydrate, thiamine, riboflavin, ascorbic acid, calcium, and selenium intake values showed no difference between the group having a complete evening meal and that not having it ($p > 0.05$). Both groups did not differ in the following: body mass index, and energy, protein, lipid, niacin, pantothenic acid, pyridoxine, folic acid, cobalamin, potassium, phosphorus, zinc, and magnesium intake values ($p < 0.05$). Regarding nutrient adequacy, the complete evening meal group performed better than the other group, except for carbohydrates, lipids, pantothenic acid, ascorbic acid, potassium, calcium, and zinc ($p < 0.05$). None of the patients showed the adequate pyridoxine, folic acid, and selenium intake values. Few patients in both groups showed adequate energy, pantothenic acid, and zinc intake values. **Conclusion:** The habit of having a complete evening meal influenced positively the micro and macronutrient intakes in chronic kidney failure patients on hemodialysis.

Keywords: chronic kidney failure, minerals, nutritional assessment, vitamins, nutritional deficiencies.

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INTRODUCTION

Changes in the dietary pattern have been observed in several developing countries.[1] In Brazil, the nutritional transition has changed the dietary intake profile, increasing the replacement of high-fiber foods rich in vitamins and minerals by industrialized products.[2,3,4] The reduction in the ingestion of foods that are usually part of the major Brazilian meals, along with the increase in the ingestion of French bread, indicate a tendency towards replacing evening dinner by rapid meals.[2] Such transformations cause the appearance of new dietary patterns, and such dietary practices can affect the fulfillment of nutritional needs,[3] and generate several nutritional deficiencies.

Malnutrition is one of the major determinants of morbidity and mortality in hemodialysis (HD) patients,[5,6] being associated with a reduced life expectancy and interfering with infectious and cardiovascular complications.[7]

Protein-energy wasting (PEW) in not the only form of malnutrition of chronic kidney failure (CKF) patients on HD, and can be accompanied by the deficiency of some micronutrients, such as vitamin B complex, vitamin C, iron, and zinc.[8] During dialysis, in addition to the catabolic action, amino acids, peptides, and water soluble vitamins are lost to the dialysate. The most commonly deficient water soluble vitamins that often require supplementation[5] are pyridoxine, and ascorbic and folic acids.[9-10]

According to the 2004 Resolution RDC 154, the nutrition professional becomes part of the minimum team required for the dialysis clinic functioning.[11] The presence of the nutritionist in that team is necessary to adequate the nutritional needs and to provide more efficient interventions.

Regarding CKF patients, several factors, such as strict dietary restrictions, use of medications that can interfere with nutrient absorption, insufficient dialysis, and constant concomitant illnesses, are responsible for metabolic, hormonal, and gastrointestinal disorders, and inadequate dietary intake. In addition, uremia, metabolic acidosis, anorexia, nauseas, vomiting, and nutrient loss to the dialysate are factors that interfere with and increase protein catabolism.[5,6,12] There is evidence that the nutritional status of kidney failure patients begins to decrease when the glomerular filtration rate reduction is still modest.[13]

Because of the scarcity of studies on dietary profiles and habits, and on their interferences with the micronutrient intake of CKF adults on HD, the present study aimed at assessing the dietary behavior of those patients regarding their habit of having evening dinner and their macro- and micronutrient intakes.

Material And Methods

This is a cross-sectional study carried out in the first trimester of 2010 with HD patients of the CENEMGE (Centro Nefrológico de Minas Gerais) dialysis clinic, in the city of Belo Horizonte, state of Minas Gerais. The patients underwent dialysis three times a week, with four-hour sessions. This study was approved by the Committee on Ethics of the UNIFENAS (protocol number 04/2010). Of the 183 HD patients, 90 participated in this study. Patients were randomly selected and later divided into two groups according to their habits of having evening dinner or not. Patients with the following characteristics were excluded from the study: age lower than 18 years; neurological and psychiatric problems; deafness; muteness; visual impairment; severe heart, neoplastic, and pulmonary diseases; HD time shorter than three months; lack of well-defined dietary habits; and evident under- or overestimation of dietary intake.

Personal (age, sex) and socioeconomic (educational level, family income, marital status) data were collected through direct interview with patients. The preservation of taste and smell was assessed through direct questions. Appetite was evaluated whether normal, increased, or decreased. Regarding the intestinal function, patients were asked about its normality, and presence of diarrhea or constipation. In addition, they were asked about the occurrence of nauseas, their dietary habits (evening dinner and meal frequency), and adherence to nutritional and clinical recommendations (underlying diseases and comorbidities). The interviewer was previously trained to avoid inducing answers.

Questions about the patients' dietary habits allowed their division into groups depending on their habit of having evening dinner or not. The study considered dinner as a meal similar to the Brazilian lunch comprised by cereals, legumes, vegetables, and a protein preparation (meats, eggs). Thus, patients who did not have dinner were those who skipped dinner or replaced it by rapid meals. Food intake was quantified by use of food habit questionnaires: two 24-hour food recalls, one on a HD day and another on a day without HD; and a food record of a weekend day. Data for the two food recalls were collected right before and during the dialysis session on different days, and the food record was completed by patients or their families following previous instructions. Those methods were associated to provide better knowledge about the patients' dietary habits during the week. Food intake amounts were estimated by use of cooking measures illustrated on a photographic album[14] presented to patients to ensure the food intake amount, and later converted into grams or milliliters. The Dietwin® nutrition software (version 8.0) was used for the dietary quantification of the food recalls, and Taco and Dietwin tables were used for nutritional information about foods according to the preparation ingested (raw or cooked). The results of the food recalls were compared with reference tables for CKF patients.[15-16]

The following biochemical parameters were assessed: pre- and postdialysis urea; creatinine; albumin (Bromcresol green);[6] serum potassium; and serum phosphorus. Dialysis adequacy was estimated through Kt/V (Daugirdas II).[6] The anthropometric parameter assessed was body mass index (BMI), calculated by dividing the individual's weight by the square of his/her height. Dry weight was used for that calculation, because the hydration status can significantly influence that assessment.

The statistical analysis of the variables was performed by calculating 95% confidence intervals, frequencies, medians, and extreme values (minimum and maximum). The non-parametricity of quantitative variables was assessed by use of the Shapiro-Wilk *W* test. In the inferential statistical analyses, Mann-Whitney test was used for comparing two experimental groups.[17] The proportions of patients' groups were also compared.[18] The raw or transformed variables with parametric distribution were compared by use of the Student *t* test, and those with a significance level equal to or lower than 5% were considered different.[17] The Stata software, version 10.0, was used for the analyses.

Results

Most patients were males (63.3% ± 10.0%). The age of most patients ranged from 46 to 75 years (68.9% ± 11.5%), and the mean age of the sample was 55.9 ± 14.7 years (range, from 19 to 87 years). Regarding the socioeconomic characteristics, most individuals were married or living in a stable union (68.9% ± 11.5%). Regarding the educational level, 62.2% (12.7%) of the individuals completed only the elementary school. Regarding the family income, most individuals had a low income (up to three minimum wages, 51.6% ± 14.4%). No significant differences ($p < 0.05$) were observed in the following variables: dialysis shift; sex; dialysis time; frequency of comorbidities; and frequency of underlying diseases.

Regarding clinical signs and symptoms, most patients showed no nausea (87.8% ± 6.8%), and had their taste (94.4% ± 4.8%), smell (94.4% ± 4.8%), and appetite (77.8% ± 8.6%) preserved. The intestinal function was normal in 83.3% ± 7.7% of the patients, although 14.4% ± 7.3% had constipation. The major underlying disease diagnosed was hypertensive nephrosclerosis (53.3% ± 10.4), followed by diabetic nephropathy (22.2% ± 8.6%), glomerulopathies (11.1% ± 6.5%), and polycystic kidneys (6.7% ± 5.2%). In addition, the major comorbidities were systemic arterial hypertension (97.8% ± 3.1%), *diabetes mellitus* (30% ± 9.5%), and heart diseases (27.8% ± 9.3%).

When analyzing the dietary habits, most patients had four to five meals per day, were used to having evening dinner, and ate their meals at home. Most claimed following nutritional guidance, which was provided at the beginning of treatment and then on a monthly basis, by use of printed material or orally by the nutritionist. Half of the patients (47) underwent potassium processing techniques. Personal choice was the major reason for not adhering to the nutritional recommendations (Table 1).

The intake values of several nutrients differed between patients having evening dinner and those not having evening dinner, except for carbohydrate, thiamine, riboflavin, ascorbic acid, calcium, and selenium (Table 2).

Nutrient adequacy percentages according to the habit of having evening dinner are shown in Table 3,

Table 1 Nutritional characteristics of chronic kidney failure adults on hemodialysis. CEMENGE, city of Belo Horizonte, state of Minas Gerais, 2010

Variable	N	Frequency (%)	95 % CI[1]
Number of daily meals			
≤ 3	21	23.3	14.4 - 32.2
4-5	50	55.6	45.1 - 66.0
> 6	19	21.1	12.5 - 29.7
Habit of having evening dinner			
Yes	57	63.3	53.2 - 73.5
No	33	36.7	26.5 - 46.8
Meal site			
Household	83	92.1	86.4 - 97.8
Outside household	7	7.9	2.2 - 13.6
Potassium processing			
Yes	47	52.2	41.1 - 62.3
No	43	47.8	37.7 - 58.9
Follow the nutritional guidance			
Yes	59	65.6	55.6 - 75.6
No	29	32.2	22.4 - 42.1
NI	2	2.2	0.0 - 5.3
Reason for not following the nutritional guidance			
Economic reason	2	2.2	0.0 - 5.3
Eating out	3	3.3	0.0 - 7.1
The cook ignores the restrictions	1	1.1	0.0 - 3.3
Personal choice	26	28.9	19.4 - 38.4
Not applicable (the patient follows the guidance)	58	64.4	54.4 - 74.5

NI: Not informed. N: number of patients assessed. 1 CI: 95% confidence interval.

Table 2 Median, minimum, and maximum values of nutrient intake according to the habit of having evening dinner of chronic kidney failure adults on hemodialysis - CEMENGE, city of Belo Horizonte, state of Minas Gerais, 2010

Nutrient intake	Habit of having evening dinner		Total	p*
	Yes	No		
Energy (kcal/day)	1580,6 (721,9 - 3110,9)	1292,3 (538,6 - 2657,0)	1481,1 (538,6 - 3110,8)	0,005
Energy (kcal/kg/day)	26,4 (12,7 - 44,8)	21,1 (8,8 - 30,9)	24,6 (8,8 - 44,8)	0,000
Carbohydrate (%TEV)	55,3 (40,2-71,5)	53,1 (39,5-65,5)	54,8 (39,5-71,5)	0,355
Protein (g/kg of weight)	1,2 (0,6 - 1,9)	0,8 (0,3 - 1,5)	1,1 (0,3 - 1,9)	0,000
Lipids (%TEV)	26,1 (14,9 - 39,7)	30,6 (19,2 - 41,4)	26,9 (14,9 - 41,4)	0,015
Thiamine (mg)	1,3 (0,7 - 8,2)	1,1 (0,3 -4,9)	1,2 (0,3 - 8,2)	0,062
Riboflavin (mg)	1,7 (0,7 - 4,5)	1,4 (0,2 -3,4)	1,6 (0,2 - 4,5)	0,123
Niacin (mg)	19,6 (9,7 - 52,7)	15,1 (4,9 - 38,7)	17,8 (4,9 - 52,7)	0,000
Pantothenic acid (mg)	2,3 (0,9 - 7,1)	1,9 (0,4 - 7,8)	2,1 (0,4 - 7,8)	0,007
Pyridoxine (mg)	1,3 (0,9 - 3,8)	1,0 (0,2 - 2,5)	1,2 (0,2 - 3,8)	0,000
Folic acid (mcg)	119,8 (23,75 - 294,10)	80,7 (27,84 - 243,01)	102,7 (23,75 - 294,10)	0,003
Cobalamin (mcg)	3,35 (0,7 - 9,2)	2,2 (0,1 - 6,8)	2,9 (0,1 - 9,2)	0,002
Ascorbic acid (mg)	54,4 (2,8 - 433,9)	51,7 (7,2 - 426,5)	54,0 (2,8 - 433,9)	0,798
Potassium (g)	2145, 9 (1116,7 - 3742,9)	1526, 5 (813,5 – 3420,0)	1981,8 (813,0 - 3712,8)	0,000
Phosphorus (mg/kg/day)	14,2 (6,0-24,0)	9,0 (2,8-22,6)	12,5 (2,8-24,0)	0,001
Calcium (mg)	313,4 (89,8 - 1406,8)	384,8 (76,8 - 1405,8)	319,0 (78,8 - 1406,8)	0,317
Zinc (mg)	12,0 (4,4 - 25,2)	6,9 (1,6 - 16,9)	10,2 (1,6 - 25,2)	0,000
Magnesium (mg)	262,5 (98,2 - 612,6)	159,6 (65,8 - 396,8)	217,5 (65,8 - 612,6)	0,000
Selenium (mcg)	0,4 (0,1 - 1,3)	0,3 (0,1 - 12,6)	0,3 (0,0 - 12,6)	0,446

Expressed as median (minimum - maximum). * Mann-Whitney test ($p < 0.05$). TEV: total energy value.

and indicate that patients who had evening dinner ingested higher amounts of most nutrients as compared with those who did not have evening dinner.[24]

Anthropometric and biochemical data were assessed according to the habit of having evening dinner, and only BMI showed statistical significance ($p < 0.05$) (Table 4).

Discussion

Most patients assessed were males, similarly to the 2008 census[19] and several other Brazilian studies.[20-25] Adult individuals and elderly predominated in this study, differently from the study by Cabral *et al.*[20] and Freitas *et al.*,[26] possibly due to the underlying disease prevalence. The low educational level and income, as reported in other studies,[20,21,25,26,27] can have influenced the understanding and adherence to the nutritional guidance provided to patients by the nutritionist, and can have contributed to the low dietary nutrient adequacy rate. The major underlying disease of the patients studied was hypertensive nephrosclerosis, followed by diabetic nephropathy, which are complications of adults and elderly, in accordance with the 2008 census[19] and the studies by Cardozo *et al.*,[22] Batista *et al.*,[24] and Morais *et al.*.[28] Such frequencies differed from those of the studies by Cabral *et al.*,[20] Santos *et al.*,[25] Freitas *et al.*,[26] and Valenzuela *et al.*,[27] in which the major etiology of chronic kidney disease (CKD) was chronic glomerulonephritis, which usually affects younger populations. The mean BMI values found were similar to the results of Valenzuela *et al.*,[27] but the groups were distinct, and further studies are required for such comparison. Regarding the biochemical tests, this study found no significance between groups.

Regarding the dietary habits, a large part of the population studied had four to five meals per day, was used to having evening dinner, and ate their meals at home, suggesting that the family can have a great influence on the patients' dietary habits. Thus, new studies should be conducted to assess that hypothesis. In this study, both groups of patients did not differ regarding dialysis shift, sex, dialysis time, frequency of different comorbidities, and frequency of underlying diseases, possibly because the sample was randomly selected and patients were divided into groups later.

Differences in protein-calorie intake were observed between the groups of patients. The group of patients with the habit of having evening dinner

Table 3 Percentages of standard value for energy, macro- and micronutrients according to habit of having evening dinner of chronic kidney failure adults on hemodialysis. CEMENGE, city of Belo Horizonte, state of Minas Gerais, 2010[26]

		Percentages of standard value (%) Habit of having evening dinner		
Nutrient intake	Parameter	Yes	No	p
Energy	≥ 35 kcal/kg/day (< 60 years) and ≥ 30 kcal/kg/day (≥ 60 years)	19.3	6.06	0.085
Carbohydrates	≥ 50 % TEV	78.9	78.8	0.986
Protein	≥1.1 and ≤ 1.3 g/kg/day	66.7	36.4	0.005
Lipid	≥ 25 % TEV/day	59.6	78.8	0.063
Thiamine	≥ 1.1 mg/day	73.7	45.5	0.007
Riboflavin	≥ 1.1 mg/day	73.7	45.5	0.007
Niacin	≥ 14 mg/day	86.0	57.6	0.003
Pantothenic acid	≥ 5 mg/day	21.1	3.0	0.620
Pyridoxine	≥ 10 mg/day	0.0	0.0	-
Folic acid	≥ 1 mg/day	0.0	0.0	-
Cobalamin	≥ 2.4 mcg/day	68.4	45.5	0.032
Ascorbic acid	≥ 75 and ≤ 90 mg/day	70.2	30.3	0.426
Potassium	≤ 3200 mg/day	94.7	90.1	0.483
Phosphorus	≥ 10 and ≤ 17 mg/kg/day	26.3	12.1	0.112
Calcium	≤ 1000 mg/day	96.5	87.9	0.114
Zinc	15 mg/day	21.1	12.1	0.286
Magnesium	≥ 200 and ≤ 300 mg/day	70.2	33.3	0.001
Selenium	≥ 55 mg/day	0	0	-

Based on K/DOQI reference values15 and Kopple.16 TEV: total energy value.

Table 4 Anthropometric and biochemical data according to the habit of having evening dinner of chronic kidney failure patients on hemodialysis. CEMENGE, city of Belo Horizonte, state of Minas Gerais, 2010.

Variable	Habit of having evening dinner				
	Yes		No		
	Mean	SD	Mean	SD	p#
BMI*	23.12	0.47	25.75	0.72	0.002
Creatinine	8.79	0.29	8.64	0.46	0. 760
Pre-HD urea	149.32	3.87	151.58	5.54	0.733
Post-HD urea*	47.72	14.78	48.30	18.82	0.871
Kt/V	1.43	0.28	1.42	0.46	0.872
Serum potassium	5.13	0.10	4.97	0.11	0. 269
Serum phosphorus	5.48	0.18	5.96	0.27	0.177
Albumin	3.90	0.05	3.84	0.08	0.435

* Variable analyzed after logarithmic transformation (base 10) and measures shown without transformation. SD = standard deviation.
# Mann-Whitney U test for analysis of serum phosphorus and albumin and Student t test for the remaining variables.

showed greater median values of protein-calorie intake. However, no difference was observed in the proportions of energetically adequate patients. Most patients were inadequate in both groups. However, BMI values were greater in patients without the habit of having evening dinner, showing that energy intake should be assessed together with the patient's body condition and adequacy rates (patients up to 60 years, 35 kcal/kg/day; and patients ≥ 60 years, ≥ 30 kcal/kg/day).[16]

The protein intake of approximately 30% of the patients with the habit of having evening dinner and of approximately 50% of those without that habit was below the 1.2 g/kg/day recommended by the NKF-K/DOQI nutrition guidelines.[15] Protein intake values below the recommended ones are in accordance with the findings of several other studies,[20,24,26-29] suggesting a negative nitrogen balance, which jeopardizes the nutritional status of HD patients. Slomowitz *et al.*[30] have reported that some patients cannot maintain protein balance and lack of uremic toxicity with an energy intake of 25 to 35 kcal/kg/day and protein intake of 1.1 g/kg/day, requiring a slightly greater protein intake of 1.2 g/kg/day.

In the group of patients without the habit of having evening dinner, lipid intake values were greater than those in the group of patients with that habit. In addition, the carbohydrate values were similar in both groups, suggesting that the rapid meals that usually replace dinner are richer in lipids and have lower protein amounts. Similarities in carbohydrate adequacy have also been reported in other studies.[21] Balanced carbohydrate and lipid intakes are important to make up for the total calorie need and to prevent protein intake from being used as an energy source.[10]

Studies related to micronutrient intake in CKF patients are scarce. Water-soluble vitamins are usually lost in the HD procedure, in the processing techniques for potassium removal, due to the interference of medications in the absorption, excretion or metabolism of those vitamins.[31] In addition, dietary restrictions with low phosphorus and potassium contents can contribute to the limitation of the ingestion of foods, such as fruits, vegetables, dairy products, meats, and other vitamin-rich foods.[32] This study assessed the low percentage of standard value of those vitamins in the dietary intake of patients, even in those with the habit of having evening dinner, and the inadequacy was worse in those without that habit.

Over half of the patients studied showed adequate values of vitamin intake (thiamine, riboflavin, and niacin). However, the percentage of standard value was greater in patients with the habit of having evening dinner, suggesting that the higher intake of protein, cereals, legumes, and vegetables can contribute to those results. Allman *et al.*[33] have reported that the deficiency of those vitamins in HD patients is not common, maybe because of the high bioavailability of those nutrients in foods.

Regarding the pantothenic acid intake, a difference was observed between patients with the habit of having evening dinner and those without it, although, in both groups, the proportion of patients with adequate intake was low and similar. In the patients studied, such findings indicate low intake of food sources of that vitamin.[35]

In all patients studied, the pyridoxine and folic acid intakes were below those recommended.[15] Allman *et al.*[33] have suggested that dietary supplementation and guidance are required for the adequacy of those values, because the pyridoxine and folic acid deficiency can jeopardize the metabolism of homocysteine, creating more atherogenic risks,[31] in addition to anemia. They can also be associated with the metabolism of tryptophan, leading to depressive disorders, insomnia, and irritability.[35]

In the present study, patients with the habit of having evening dinner showed higher values of adequate cobalamin intake when compared with the group without that habit. Adequate cobalamin intake helps in the folic acid metabolism, and, thus, in the homocysteine metabolism, because the folic acid deficiency in this study and in other studies was relevant.[33] According to Descombes *et al.*[9], cobalamin supplementation is not necessary, because its deficiency is uncommon in CKF patients. This suggests that an adequate dietary intake is sufficient to achieve the nutritional recommendations.

Regarding ascorbic acid intake, no difference was observed between groups. This is explained by the fact that ascorbic acid sources, such as citric fruits, are not common in the evening dinner.

Regarding the dietary mineral intake, most patients showed no excessive potassium intake, corroborating the result of the study by Scapin *et al.*[29] Although no difference was observed in the percentage of standard value of the groups, individuals who have evening dinner are likely to have a higher intake of potassium source foods.

The phosphorus intake of most individuals did not exceed the recommended values, in accordance with that reported by Valenzuela *et al.*[27] and Pinto *et al.* [34]

Chronic kidney failure patients on HD need a hyperproteic diet, and protein sources are usually rich in phosphorus. Dietary phosphorus restriction is important to guarantee the calcium and phosphorus homeostasis in bone mass maintenance, because HD is not an efficient method of removing that mineral. Calcium-rich foods are usually rich in phosphorus, thus, CKD patients on HD usually should not eat large amounts of such foods.[6,16] In this study, the amount of calcium intake and the proportion of individuals with an adequate calcium intake did not differ in the populations with the habit of having evening dinner and without it. Cabral *et al.*,[20] Batista

et al.,[24] Freitas *et al.*,[26] Valenzuela *et al.*[27] have reported results similar to ours, with values below the recommended maximum limit.[15,16]

Selenium intake did not differ in the two groups of patients, and none of them achieved the minimum value recommended for healthy patients,[35] which was the parameter used because no selenium intake reference value was found in the literature for CKF patients on HD. Selenium intake is primarily associated with protein-source intake,[10] and the amount of that mineral varies largely according to the soil type.[35] It is worth noting that the Brazilian food composition tables lack the selenium reference values.

Magnesium intake differed between the two groups of patients, suggesting a relationship with protein intake. In addition, the major magnesium sources are leafy vegetables, legumes, and nuts,[35] which are also rich in potassium and moderately consumed by CKF patients on HD. The adequacy percentage differs between both groups, and the greatest values are found in patients with the habit of having evening dinner.

Similarly to that found in the present study, Cabral *et al.*[36] have reported a low zinc intake in CKF patients on HD. The habit of having evening dinner did not significantly influence the proportion of individuals with an adequate zinc intake. Mafra and Cozzolino,[37] who obtained a mean zinc intake of 6.3 mg/day, have reported that zinc intake was reduced mainly with a hipoprotein. Zinc deficiency in CKF patients on HD has been associated with appetite loss, and a reduction in taste and smell,[6] which were not observed in this study.

The results emphasize the need for a joint work of physicians and nutritionists, aiming at individually assessing the possible vitamin and mineral supplementation, considering the patients' food habits, to fulfill the intake needs according to the recommendations in the literature.[15,16]

The dietary studies still lack a gold standard method to assess food intake. The existing tools, such as food recall and record, are considered efficient when properly applied,[38] thus, such methods are often used in research. Because the patient's report can under- or overestimate dietary intake, those tools are subjected to bias. Thus, a good transcription of the patient's report could minimize that technical limitation.

It is worth noting that Brazilian food composition tables lack complete information about all nutrients found in foods, an information extremely relevant for diet assessment.

Conclusion

In conclusion, the habit of having evening dinner influences positively the macro- and micronutrient intake of CKF patients on HD, because those patients showed more adequate intake values of those nutrients according to specific recommendations for that population. The nutritionist, a member of a multidisciplinary team, can assess and individually correct the food intake of his/her patients. His/her action as a nutritional advisor can contribute to promote changes in dietary habits, stimulating patients to recover the evening dinner habit. In addition, that professional along with the physician should plan the supplementation of possible nutritional deficiencies observed. Individualized nutritional follow-up is paramount for the maintenance and recovery of the nutritional status, contributing to the patients' better quality of life.

Brazilian studies on this subject are scarce. Thus, further studies are required to enhance the knowledge about the dietary behavior and its influence on the dietary macro- and micronutrient profile of CKF patients on HD.

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