Nutritional and epidemiological aspects of patients with chronic renal failure undergoing hemodialysis from Brazil, 2010

Authors
Bárbara Margareth Menardi Biavo[1]
Carmen Tzanno-Martins[2]
Lucas Maciel Cunha[3]
Melissa Luciana de Araujo[4]
Márcia Machado Cunha Ribeiro[5]
Anita Sachs[6]
Clarissa Baia Bargas Uezima[7]
Sérgio Antonio Draibe[8]
Cibele Isaac Saad Rodrigues[9]
Elvino José Guardão Barros[10]

[1] Specialist (Nutrition Coordinator of the CINE-HDC-RENALCLASS Group).
[2] Doctor (Director of the CINE-HDC - RENALCLASS Group).
[3] Master (Doctoral Candidate).
[4] Specialist (Technical Nutritionist in charge. CENEMGE E CLINEMGE).
[5] Specialist (Outpatient Nutritionist).
[6] Doctor (Preventive Medicine Associate Professor - UNIFESP).
[7] Master (Home Program Clinic Nutritionist PROHDOM - SPDM).
[8] Doctor (Assistant Professor-Lecturer).
[9] Doctor (Full Professor of Nephrology of the Medical Science and Health College - PUC-SP Arterial Hypertension Department Director of SBN).
[10] Post Doctorate (Assistant Professor UFRGS.

Submitted on: 11/18/2011.
Approved on: 04/30/2012.

Correspondence to:
Bárbara M. M. Biavo.
Nutrition Committee - Brazilian Society of Nephrology.
Rua Machado Bittencourt, nº 205, 5º andar, conj. 53. Vila Clementino, São Paulo, SP, Brazil.
CEP: 04044-000.
E-mail: barbara_biavo@yahoo.com.br.
Tel/Fax: (11) 3123-3900.

ABSTRACT

Introduction: The Nutrition Committee of the Brazilian Society of Nephrology (SBN) held in 2010 the first Brazilian Nutrition Census in hemodialysis patients. Multicenter data contribute to clinical development and nutritional intervention. **Objective:** To describe epidemiological and nutritional aspects of hemodialysis patients. **Method:** Cross-sectional study in 36 dialysis clinics and 2,622 randomly selected participants. Socio-demographical, clinical, biochemical and anthropometric records were collected. **Results:** 60.45% of the patients lived in the Brazilian Southeast. 13.53% came from Northeast region, while 12.81% from South, 10.33% from Midwest and 2.86% from North regions. Approximately 58% were male and 63.1% were below 60 years old. 58.5% of patients were married or in cohabitation. Around 80% of them depended on the government Unified Health System. Smoking showed a difference between gender and age. Presumptive etiologies were Hypertensive Nephrosclerosis (26.4%), Diabetic Nephropathy (24.6%), unknown/undiagnosed causes (19.9%), Glomerulopathies (13.6%) and others (11.2%). Both Hypertension and Diabetes Mellitus affect approximately 30% of patients, especially over 60 years. Body Mass Index did not differ between genders, although it differed between age groups and when used different evaluation criteria. Men and women average waist circumference were respectively 90.5 and 88.0 cm. Lipid profile did not differ between age groups, but it did between genders. Albumin values were lower in women and in patients older than 60 years. **Conclusion:** This study characterized Brazilian hemodialysis patients in 2010, and may support further studies to monitor nutrition and epidemiological transitions of the population.

Keywords: censuses, nutritional status, renal dialysis.

INTRODUCTION

The Nutrition Committee of the Brazilian Society of Nephrology conducted the first Brazilian Nutrition Census in hemodialysis patients in 2010, by voluntary participation.[1] Several difficulties were encountered in collecting and obtaining data, which depended on the commitment of several professionals (nephrologists and nutritional physicians) from dialysis centers across Brazil. Nevertheless, we obtained an impressive number of contributions, which allowed the analysis of approximately 2500 patients under a chronic hemodialysis program.

Recording multicenter data from chronic patients may contribute to the development of clinical practices and nutritional intervention involved in the treatment, and consequently to the establishment of better aid.[2] Currently, most of the publications about nutrition, especially in patients with chronic kidney diseases (CKD) undergoing hemodialysis, cover regional or local populations and samples with a reduced number of participants.[3-6] This census is the first study to present the nutritional aspects of this population covering all of the Brazilian territory. Our goal is to describe the nutritional and epidemiological characteristics of patients with CKD undergoing hemodialysis in Brazil in the year 2010.

Materials and Methods

This is a cross-sectional study comprising adults and elderly individuals undergoing hemodialysis in 36 dialysis clinics spread throughout Brazil, who voluntarily accepted (December 2009) the invitation from the Nutrition Committee of the Brazilian Society of Nephrology to participate in the study, after signing and sending an agreement. Data collection took place between January and July 2010. Most patients in the participating clinics were undergoing the classic hemodialysis treatment: 4-hour sessions, 3 times a week. The participating centers received an e-mail with a form containing specific questions developed by the committee team. After the data collection, the databases were e-mailed to the Nutrition Committee. The nutritionists at the clinics, in charge of collecting the data, were instructed about the procedures and protocols when the form was sent, but the committee did not interfere with the process.

The inclusion criteria for patients were as follows: aged ≥ 18 years, undergoing a classic hemodialysis program; the exclusion criteria were as follows: aged < 18 years, or undergoing another type of renal replacement therapy. A total of 2622 patients undergoing a chronic hemodialysis program comprise the study sample (50% of the total number of patients from the dialysis unit). The selection was performed at random by choosing alternating patients in the alphabetical list, and all the selected patients agreed to participate in the study.

The sociodemographic information (age, sex, race, civil status, and smoking status) and clinical data (hemodialysis time, dry weight, interdialytic weight gain [average value at the month the data were collected], access type for the procedure, number of absences, comorbidities [*Diabetes Mellitus* - DM, systemic arterial hypertension - SAH], etiology of the CKD [diabetic nephropathy, hypertensive nephrosclerosis, glomerulopathies, polycystic kidney, unknown causes, other]) were obtained through a clinical records survey.

We followed the consensus of the World Health Organization (WHO) that establishes "elderly individuals" in developing countries as those ≥ 60 years of age. We also analyzed serum biochemical parameters (albumin, triglycerides, total cholesterol, and its fractions) from the results of the last examinations at pre-dialysis, available in medical records (varying from 0 to 6 months, as some of these examinations are performed quarterly or biannually in accordance to RDC154).[7] The efficiency of the dialysis was estimated using Kt/V indices (according to the Daugirdas II formula).[8] Waist circumference (WC) and body mass index (BMI) were used as anthropometric measurements; BMI is the ratio between the dry weight (kg) and the square of the height (m^2).

To avoid potential influences of the hydration state in this assessment, all of the researchers were nutritionists and they were instructed that the anthropometric measurements collected in the nutritional assessment protocol of each dialysis center be within the following standards: a stadiometer should be used for the measurement of height; at the time of measurement, the patient should be barefoot, with heels together, back straight, and arms extended alongside the body. For the WC, the standard used was the umbilicus to minimize error among researchers.

Descriptive statistical analysis of the variables was conducted by calculating the frequencies, medians, 25% values, and 75% values. The sample standard errors or 95% confidence intervals of the variables expressed in proportion form were calculated and expressed along with the percentage values. In relation to variables such as smoking, BMI, WC, and Kt/V, the possible interactions between sex and age of the patients were verified by the *odds ratio* of Mantel-Haenszel or by the Friedman test. The nonparametric verification of the quantitative variables was conducted using the Shapiro-Wilk "W" test, before or after logarithmic and radical transformations of the data.

The comparisons were performed for the country as a whole and, hence, potential characteristic influences, such as region of the country or racial groups interviewed, were disregarded. Comparisons with different parameters for patient groups of different sexes and different ages (< 60 years and ≥ 60 years) were conducted. Comparisons between groups of nondichotomous and nonnormalized variables were conducted using the Mann Whitney test.[9] The comparisons between the proportions for the groups were conducted using the Pearson Chi-squared test,[9] with *a posteriori* comparisons of d*ummy* variables for the vascular access type and race data (white, black/mixed race, and others). For

the analyses, the Stata program, version 10.0, was used, considering differences with significance level equal to or below 1%.

Results

A total of 2622 patients were assessed, with 60.45% (1582) from the southeast region, 13.53% from northeast (355), 12.81% from south (336), 10.33% from midwest (271), and 2.86% from north (75).

Most patients were males (58.4% ± 1.9%) aged ≤ 60 years (63.1% ± 1.86%). We verified a higher number of Caucasian patients in the south region and those of African descent in the north and northeast regions (Table 1).

With regard to civil status, 58.5% ± 1.8% of patients were married or in cohabitation. With regard to education, we verified a high rate of illiteracy, especially in the northeast region, and a predominance of < 8 years of education in this population (Table 1). Most patients were homeowners (80%). However, sanitary conditions varied according to region. While more than 90% of the homes in the north and southeast regions, and 85% in the south region had a sewage network, this percentage was reduced to 60% and 70% in homes in the northeast and midwest regions, respectively.

Most patients (80%) were on welfare and dependent on the Universal Healthcare System (SUS). However, we observed a great disparity in the percentage of patients undergoing treatment through

Table 1 Population characterization by region (race, education, and plan coverage) of CKD patients undergoing hemodialysis

Variables		Regions					Brazil	n
		North	Northeast	Midwest	Southeast	South		
Race	White	0 (0-0)	28.9 (22.2-35.5)	43.5 (37.6-49.5)	44.8 (42.4-47.3)	46.4 (44.4-48.4)	78.6 (74.1-83.3)	2621
	Black	10.7 (3.6-17.7)	16.7 (11.2-22.1)	25.5 (20.3-30.7)	21.5 (19.4-23.4)	20.1 (18.5-21.7)	12.8 (9.0-16.5)	
	Mixed race	88.0 (80.6-95.4)	52.7 (45.5-60.1)	29.9 (24.4-35.4)	31.7 (29.4-34.0)	31.8 (29.9-33.7)	7.9 (4.8-10.9)	
	Other	1.3 (0-2.9)	1.7 (0-3.5)	1.1 (0-2.4)	2.0 (1.3-2.7)	1.7 (1.2-2.2)	0.7 (0-1.6)	
Education	Illiterate	1.3 (0-3.9)	23.0 (18.5-27.5)	5.2 (2.5-7.8)	6.5 (5.3-7.7)	8.1 (7.1-9.1)	4.8 (2.5-7.1)	2589
	1-4 years	24.0 (14.3-33.7)	36.7 (31.5-41.9)	14.0 (9.9-18.2)	32.4 (30.1-34.7)	30.4 (28.6-32.2)	29.5 (24.5-34.3)	
	Between 4 and 8 years	32.0 (21.4-42.6)	11.1 (7.7-14.4)	26.9 (21.6-32.2)	30.3 (28.1-32.6)	28.3 (26.6-30.0)	36.3 (31.2-41.5)	
	Between 8 and 11 years	38.7 (27.6-49.8)	10.4 (7.2-13.7)	21.8 (16.8-26.7)	18.1 (16.2-20.0)	17.9 (16.4-19.4)	16.5 (12.5-20.5)	
	> 11 years	4.0 (0-8.5)	18.8 (14.6-23.0)	32.1 (26.5-37.7)	12.7 (11.1-14.3)	15.3 (13.9-16.7)	12.9 (9.3-16.5)	
Coverage	SUS (Universal Healthcare System)	89.3 (82.3-96.4)	99.7 (99.2-100.0)	64.2 (58.5-69.9)	82.1 (80.2-83.9)	82.1 (80.6-83.7)	86.3 (82.6-89.9)	2616
	Health Insurance	10.7 (3.6-17.7)	0.3 (0-0.9)	35.8 (30.1-41.5)	17.9 (16.0-19.8)	17.9 (16.3-19.4)	13.7 (10.0-17.4)	
	Fistula	100,0	88,4 (85.1-91.8)	91,4 (86.9-93.9)	91,1 (89.7-92.5)	92,9 (90.1-95.6)	91,2 (90.1-92.3)	
Access types	0,0	0,0	0.1 (0.0-2.4)	0,0	0,0	0.1 (0.0-0.3)	0.1 (0.0-0.3)	2616
	0,0	3.3 (1.5-5.3)	7.4 (4.3-10.5)	4,1 (3,1-5,1)	3.0 (1,2-4,8)	4.1 (3.3-4.8)	4.3 (3.4-5.1)	
	0,0	8.2 (5.3-11.5)	1.1 (0.0-2.4)	4,7 (3,7-5,8)	4.1 (2.0-6,3)	4.6 (3.8-5.4)	4.7 (3.8-5.6)	

CI: 95% confidence interval; Perm. Cat.: permanent catheter; Temp. Cat.: temporary catheter.

private health insurance. While in the northeast region the number of patients receiving treatment through private health insurance comprised < 1% of the total patients, the midwest region featured 35%, followed by approximately 18% in the southeast region (Table 1).

Smoking is a cardiovascular risk factor. We verified a higher ratio of smokers among men aged ≤ 60 years (18%), when compared with men > 60 years (15.5%). Such ratio difference did not occur significantly among women of different ages (Table 2).

The most frequent presumptive etiology of CKD was hypertensive nephrosclerosis (26.4% ± 1.8%), followed by diabetic nephropathy (24.6% ± 1.7%), unknown or undiagnosed causes (19.9% ± 1.6%), glomerulopathies (13.6% ± 1.4%), and others (11.2% ± 1.2%). Both SAH and DM were found in approximately 30% of patients, especially in those ≥ 60 years of age.

The arteriovenous fistula is the preferred type of vascular access for the hemodialysis procedure across the country, present in approximately 90% of the patients. However, patients ≥ 60 years of age showed a significantly higher number of vascular accesses with a permanent catheter.

We verified good treatment attendance in most of the assessed clinics, as only 3.5% (2.8%-4.9%) of the patients missed the sessions more than once a month.

Table 2 Ratio of sociodemographic and clinical data of the patients, according to sex and age for patients with chronic kidney disease undergoing hemodialysis, Brazil, 2010

Variables		Sex (%)		Total	*p**	n
		Male	Female			
Comorbidities	DM	31.14	29.80	30.60	0.463	2619
	SAH	58.54	41.46	85.38	0.683	2511
Habit	Smoking	15.31	7.83	12.21	0.000	2613
Race	White	45.96	45.90	45.94	0.994	2621
	Mixed race/black	51.89	51.89	51.89	0.994	
	Other	2.15	2.21	2.20	0.994	
Access type	Fistula	92.73	88.30	91.20	0.000	2280
	Prosthesis	0.00	0.32	0.10	0.000	
	Perm. Cat.	3.04	6.01	4.10	0.000	
	Temp. Cat.	4.23	5.36	4.60	0.000	
Coverage	SUS (Universal Healthcare System)	87.42	86.60	87.08	0.538	2614
	Health Insurance	12.58	13.40	12.92	0.538	
Variables		Age (%)		Total	*p**	n
		60 years	> 60 years			
Comorbidities	DM	21.22	46.32	30.49	0.000	2578
	SAH	85.54	84.92	85.31	0.675	2485
Habit	Smoking	14.37	8.83	12.33	0.000	2572
Race	White	40.22	55.49	45.82	0.000	2584
	Mixed race/black	57.76	41.98	51.97	0.000	
	Other	2.02	2.53	2.21	0.000	
Access type	Fistula	92,60	88,12	90,95	0,001	2244
	Prosthesis	0,14	0,12	0,13		
	Perm. Cat.	3,03	6,30	4,23	0,001	
	Temp. Cat.	4,23	5,45	4,68		
Coverage	SUS (Universal Healthcare System)	90.32	18.71	87.01	0.000	2578
	Health Insurance	9.68	46.32	12.99	0.000	

* significance 0.01; DM: Diabetes Mellitus; SAH: systemic arterial hypertension; Perm. Cat.: permanent catheter; Temp. Cat.: temporary catheter. n: number of sampled patients.

With regard to the nutritional characteristics characterized by region, the northeast region showed higher indices of elderly patients with low weight, when compared with the other regions (Table 3). The north region showed a lower ratio of patients with WC values above the references adopted by WHO, in both men and women (Table 3). However, the north region showed a higher ratio of patients with albumin < 3.8 g/dl and a higher ratio of weight gain above 4.5% of the dry weight.

When compared according to sex (Table 4), female patients gained less interdialytic weight than male patients did, and they presented higher Kt/V indices, or better dialytic compliance. We compared

Table 3 Frequencies of nutritional and anthropometric parameter occurrences in patients undergoing hemodialysis in different regions of Brazil, 2010

Nutritional characteristics	Region (%)					Brazil (%) Total	n
	North	Northeast	Midwest	Southeast	South		
BMI[1]-WHO (18-59 years of age)							
< 18.5 kg/m²	5.8 (0.6- 12.2)	12.3 (7.8-16.7)	6.4 (2.7-10.1)	8.3 (6.6-10.1)	4.9 (1.9-7.9)	8.13 (6.8-9.5)	1585
18.5-24.9 kg/m²	53.8 (40.2-67.5)	60.2 (53.6-66.8)	52.0 (44.5-59.6)	56.2 (53.1-59.4)	54.7 (47.8-61.5)	56.0 (53.6-58.5)	
25.0-29.9 kg/m²	28.8 (16.4-41.3)	20.9 (15.4-26.4)	32.2 (25.1-39.2)	23.4 (20.7-26.1)	26.1 (20.0-32.2)	24.5 (22.4-26.7)	
30.0-34.9 kg/m²	9.6 (1.5-17.7)	6.1 (2.9-9.4)	7.0 (3.2-10.9)	8.8 (7.0-10.6)	11.8 (7.4-16.3)	8.6 (7.3-10.0)	
35.0-39.9 kg/m²	1.9 (1.8-5.7)	0.5 (0.4-1.4)	2.3 (0.1-4.6)	3.2 (2.0-4.3)	2.5 (0.3-4.6)	2.6 (1.8-3.4)	
40.0 kg/m²	- (0.0)	- (0.0)	- (0.0)	0.1 (0.1-0.3)	- (0.0)	0.1 (0.1-0.2)	
BMI[1] (kg/m²) ≥ 60 years of age							
< 22.0 kg/m²	42.9 (21.1-64.6)	42.7 (34.2-51.3)	18.9 (11.0-26.9)	34.8 (31.0-38.7)	22.7 (15.4-29.9)	32.9 (30.0-35.9)	972
22.0-27.0 kg/m²	52.4 (30.5-74.3)	38.2 (29.8-46.5)	50.5 (40.4-60.6)	41.7 (36.8-44.7)	49.2 (40.5-57.9)	42.7 (39.6-45.8)	
> 27.0 kg/m²	4.8 (4.6-14.1)	19.1 (12.3-25.9)	30.5 (214.2-39.8)	24.5 (21.0-27.9)	28.1 (20.2-35.9)	24.4 (21.7-27.1)	
IMC[1]-EBPG[2]							
< 23 kg/m²	46.7 (35.3-58.0)	52.0 (46.7-57.3)	35.3 (29.6-41.0)	46.2 (43.8-48.7)	35.5 (30.4-40.7)	44.5 (42.6-46.4)	2577
Waist circumference (cm)[3]							
Female > 80 cm	48.1 (28.9-67.4)	74.8 (66.3-83.2)	74.8 (66.8-82.8)	68.2 (64.6-71.9)	75.8 (69.0-82.7)	70.2 (67.4-73.0)	1020
Male > 94 cm	19.1 (7.8-30.5)	44.1 (35.9-52.2)	51.3 (43.3-59.4)	37.2 (34.1-40.4)	51.4 (44.1-58.6)	40.6 (38.1-43.2)	1425
Albumin[4]-EBPG							
< 3.8 g/dl	53.3 (41.9-64.7)	23.7 (19.2-28.1)	37.0 (31.3-42.8)	37.7 (35.3-40.1)	47.7 (42.3-53.1)	37.4 (35.6-39.3)	2567
IDWG[5]-EBPG							
< 4% of DW[6]	43.2 (31.9-54.6)	62.1 (55.2-69.0)	57.6 (51.7-36.5)	52.6 (49.9-55.2)	57.6 (51.6-63.6)	54.3 (52.2-56.5)	2156
4.0%-4.5% of DW	14.8 (06.7-23.0)	09.0 (04.9-13.1)	13.8 (09.7-17.9)	11.4 (09.7-13.1)	09.7 (06.1-13.3)	11.4 (10.0-12.7)	
> 4.5% of DW	41.9 (30.6-53.2)	28.9 (22.5-35.4)	28.6 (23.2-34.0)	36.6 (34.0-39.1)	33.3 (27.7-39.0)	34.7 (32.7-36.7)	

[1] BMI: body mass index, according to WHO for adults and Lipschitz for the elderly.[2] EBPG Nutrition Guideline.[3] Waist circumference according to WHO.[4] Albumin according to the European consensus.[5] IDWG: interdialytic weight gain.[6] DW: dry weight.

Table 4 Dialysis data medians, anthropometric data, and biochemical test results according to the sex of CKD patients undergoing hemodialysis, Brazil, 2010

Variables	Total Median (*p*25-*p*75)	Sex		n	*p**
		Male Median (*p*25-*p*75)	Female Median (*p*25-*p*75)		
Anthropometry					
Kt/V	1.40 (1.22-1.61)	1.32 (1.18-1.49)	1.55 (1.33-1.73)	2259	0.000
Int. weight gain (%)	3.8 (2.7-4.9)	3.9 (2.8-4.9)	3.7 (2.7-5.0)	2158	0.166
HD time (months)	34.13 (15.46-69.82)	33.28 (15.17-68.10)	35.10 (16.07-72.90)	2490	0.142
BMI (kg/m²)	23.56 (20.89-26.81)	23.51 (20.98-26.59)	23.72 (20.74-27.24)	2594	0.446
WC (cm)	90.00 (80.00-100.00)	90.50 (81.00-100.00)	88.00 (77.00-98.00)	2553	0.000
Biochemical tests					
Albumin (g/dl)	4.00 (3.70-4.29)	4.00 (3.70-4.30)	3.90 (3.63-4.20)	2559	0.000
Triglycerides (mg/dl)	136.00 (95.00-202.00)	131.70 (93.00-199.00)	141.00 (97.00-210.00)	2365	0.012
Total cholesterol (mg/dl)	156.00 (128.00-189.00)	150.00 (123.00-180.00)	167.00 (140.00-197.00)	2405	0.000
LDL (mg/dl)	83.50 (51.60-109.00)	79.00 (55.00-103.80)	89.00 (65.00-116.10)	2231	0.000

* significance 0.01; *p*25-*p*75 (percentage between 25% and 75%); HD: hemodialysis; BMI: body mass index; WC: waist circumference; LDL: low-density lipoproteins.

dialysis time, type of access, and race in relation to the patients' sex, and we verified that these variables are independent of sex.

Patients < 60 years old showed more time in the hemodialysis program and more interdialytic weight gain. With regard to age (Table 2), we verified a higher frequency of DM in patients aged ≥ 60 years. We also observed, according to race, that Caucasians have a higher ratio of patients ≥ 60 years old than African descendants.

In relation to anthropometric characteristics, we verified that the BMI calculation did not differ between sexes. However, there were significant differences between age groups (Table 5), and both median values were within the reference values used for the general population, according to WHO (18.5-24.9 kg/m²).[10]

With regard to the WC, women showed median values that were higher than those recommended by WHO (≤ 80.0 cm).[11] As for men, more than half of the patients in the sample were within the recommended values (≤ 94.0 cm).[11]

The lipid profile of the patients did not differ in relation to age; however, we observed differences between the sexes. The values of the medians were within the reference values according to the IV Brazilian Guideline for Dyslipidemia.[12]

The median values of albumin were lower in women as well as in patients aged ≥ 60 years; however, the difference was small and insignificant.

Discussion

The assessment of the obtained data enabled us to determine the epidemiological and nutritional profile of Brazilian patients under chronic hemodialysis programs. However, the study has some limitations. Among them, the low responsiveness of the forms was a particularity taken into consideration during the characterizations conducted, as approximately one-twentieth of all dialysis centers participated in the study-approximately 5% of the population of patients undergoing dialysis treatment in Brazil, with most records being from patients receiving treatment in the southeast region.

Moreover, nutritional profile comparisons of the Brazilian regions should be conducted in new studies, taking into consideration several characteristics of these geographical spaces, to control the presence of confusing variables and to discuss in depth all of the diversities of the target population. Biochemical serum values, such as bicarbonate and phosphorus, would be useful in assessing the effect of metabolic acidosis on the lean mass of these patients; however, these were not analyzed in this study because of unavailability of data.

Another limitation worth mentioning is that laboratory data were collected from patient charts. This means that different biochemical variables may have been measured using different techniques. Additionally, the examinations were not performed on the same date in all clinics, and they were not collected for the study; those from routine examinations were used.

Table 5 Dialysis data medians, anthropometric data, and biochemical test results according to the age of CKD patients undergoing hemodialysis, Brazil, 2010

Variables	Total Median (p25-p75)	Age		n	*p**
		60 years Median (p25-p75)	> 60 years Median (p25-p75)		
Anthropometry					
Kt/V	1.40 (1.22-1.61)	1.39 (1.22-1.61)	1.42 (1.23-1.62)	2246	0.270
Interdialytic weight gain (%)	3.8 (2.7-4.9)	4.1 (3.0-5.3)	3.3 (2.4-4.3)	2149	0.000
HD Time (months)	33.87 (15.34-69.44)	36.41 (16.30-72.73)	30.23 (13.27-63.94)	2456	0.000
BMI (kg/m^2)	23.56 (20.89-26.78)	23.13 (20.58-26.50)	24.24 (21.49-27.32)	2559	0.000
WC (cm)	90.00 (80.00-99.50)	87.00 (78.00-97.00)	93.00 (84.30-103.00)	2519	0.000
Biochemical tests					
Albumin (g/dl)	4.00 (3.70-4.28)	4.00 (3.70-4.30)	3.90 (3.60-4.20)	2523	0.000
Triglycerides (mg/dl)	136.00 (95.00-202.00)	139.00 (96.00-209.00)	131.00 (94.00-191.5)	2332	0.058
Total cholesterol (mg/dl)	156.00 (128.00-189.00)	155.00 (127.00-190.00)	158.00 (130.00-188.00)	2371	0.255
LDL (mg/dl)	83.00 (58.4-108.80)	82.00 (58.00-107.00)	85.40 (60.00-111.00)	2198	0.116
HDL (mg/dl)	38.00 (31.00-48.80)	38.00 (30.00-48.00)	38.92 (31.00-49.00)	2252	0.083

* significance 0.01; *p*25-*p*75: percentage between 25 and 75; HD: hemodialysis; BMI: body mass index; WC: waist circumference; LDL: low-density lipoproteins; HDL: high-density lipoproteins.

The northeast region showed the least number of homes with a sewage network, the lowest education, the highest illiteracy rate, and the highest dependency on public health aid. Adding to these characteristics, we also verified a higher ratio of patients with low weight (WHO[10] and European Consensus on Nutrition).[13] These results signal the need for new studies to verify the effects of housing infrastructure quality and educational level on the nutritional indicators covered by this study.

The data on sociodemographic characterization, CKD causes, and the presence of comorbidity are similar to the results obtained in the last dialysis census conducted by the Brazilian Society of Nephrology.[2,14] We observed a lower number of patients on welfare (80%) in relation to the dialysis patient census conducted by the Brazilian Society of Nephrology (85.8%), perhaps due to the difficulty in organizing nutrition services in clinics that are more dependent on the SUS.

We verified that the most frequent presumptive etiology of CKD was hypertensive nephrosclerosis (26.4%) followed by diabetic nephropathy (24.6%). These data are in compliance with the national data, which, however, show a more accentuated dominance of hypertensive nephrosclerosis (35.2%), followed by 27.5% of cases of diabetic nephropathy.

In relation to the comorbidities, SAH was frequent in this population, regardless of sex or age, being a little more present in male patients (59.68% versus 40.32%). On the other hand, *DM* was more present in elderly patients (46.32% versus 21.22%), in compliance with the data from VIGITEL 2010, which verified a growing number of diabetic and hypertensive patients with increasing age in Brazil.[15]

Smoking is not frequent in the population assessed; the overall frequency found was low. Nevertheless, smoking is more common in elderly men, which deserves additional attention.

With regard to dialytic compliance, most patients showed regular attendance to the sessions, with Kt/V above the recommended values (Kt/V > 1.2) and a small gain of interdialytic weight (a gain below 4% of the interdialytic dry weight was considered as a low weight gain). Other obtained data (20.7%) were similar to those obtained by the dialysis census from the Brazilian Society of Nephrology, which detected 19.2% with Kt/V values below the recommended values. We verified that the Kt/V value was better in female patients, possibly because the dialysis dosage was higher in this group with less body surface, as most dialysis clinics standardize the size of the capillary filter for the overall population in the program.

With regard to vascular access, we verified that temporary catheters were more frequent in female and elderly patients, approximately twice that of permanent catheters. In contrast, we verified a total percentage (8.5%) below the national average of 13.6%.

On the basis of the WHO classification for identifying the elderly population (≥ 60 years), we verified that 36.9% of patients in hemodialysis programs are elderly-data similar to that obtained by the Brazilian Society of Nephrology 2009 census (39.9%).

With regard to the nutritional characteristics, approximately 45% of the individuals in all regions were classified as eutrophic. Approximately 7% of the adults (18-60 years old) and 25% of the elderly (> 60 years old) showed low weight (WHO[10] and Lipschitz).[16] However, according to the EBPG Guideline on Nutrition,[13] approximately 42% of the patients were classified as being under nutritional risk. The ideal cutoff point for BMI is controversial, as lower values for this index are associated with a higher mortality rate.[17,18] It is also worth noting that BMI is not considered sensitive for detecting protein depletion and visceral fat increase, and it may also be influenced by water retention, which is relatively frequent in patients with chronic renal disease.[19]

WC is considered the best predictor of visceral fat[20,21] and, at present, the recommendations proposed are for young adults, without considering changes in fat distribution that commonly occur with aging.[22,23] As in our study most patients were in the age range below 60 years, we can infer that the WC value is a parameter that can be used in this population.

Lipid metabolism presents changes from the initial phases of CKD, and the presence of coronary disease is common, even in the presence of normal levels of low-density lipoproteins. Although in this population, the expected plasma concentrations of triglyceride are high, we did not verify any difference between the triglyceride values across groups. We verified high-density lipoprotein levels[24] below what is expected to protect the cardiovascular system in both sexes. However, these findings should be interpreted with caution, as the present study did not survey which patients made use of hypolipemiant drugs, which may directly interfere with the results found.

Cardiovascular mortality is increased in patients with CKD undergoing a hemodialysis program. In the United States, data analysis performed between 1994 and 1996 for this population observed a risk of death of approximately 10 to 100 times greater in patients undergoing hemodialysis than for the overall population corrected by age,[25] and cardiac disease was the cause of death in approximately 45% of patients undergoing hemodialysis.[26] In Brazil, according to the Brazilian Society of Nephrology dialysis census of 2009,[14] the mortality rate in this population is also high and the main causes of death are cardiovascular (34.9%) and cerebrovascular (8.8%) diseases, totaling 43.7% of the cases, followed by infection (24.3%).

Serum levels of albumin may be considered late markers of malnutrition, broadly used in individualized clinical practice for CKD patients, as hypoalbuminemia values suggest future risk of disease and death.[13] Results of albumin serum level measurements may be influenced by inadequate dietary consumption of calories or proteins, hydration status, inflammation, anabolic or catabolic processes, age, urinary loss, hepatopathies, and iron deficiency anemia.[13,27] However, values below 3.8 g/dl, as proposed by the EBPG, were present in 37.4% of the sample, which shows the need for more studies with this cutoff point, to investigate the adequate value to be validated for CKD in Brazil. The study was performed nationwide and may differ from the findings of other countries.

Conclusion

This study covered nutritional variables used routinely in clinical practice by nutritionists who assist CKD patients undergoing hemodialysis. The results showed that age must be taken into consideration in the nutritional assessment, in addition to the differences found in lipid profile, dialysis efficiency, and ratio of hypertensive patients.

Similarly, the patient's sex is also relevant and should be given attention, as it presented a difference with regard to dialysis quality, interdialytic weight gain, WC, lipid profile, and albumin. It should not be assessed along with comorbidities, race, and BMI.

This study showed the importance of describing the nutritional epidemiological profile in Brazil, and may in the future subsidize new comparative

studies to follow up on the nutritional and epidemiological transitions of the population undergoing hemodialysis.

Acknowledgments

Contributing nutritionists:

Adaiane Calegari, Adriana Cândida da Silva, Adriana Ortiz, Alika Martins, Aline Marques, Ana Aurora Teixeira, Andréia Aquino, Andréia Dantas, Carla Andreas Canton, Chislene Vanelli, Jacqueline Santos, Camila Barros, Clarissa Uezima, Claudia Pauletto, Cristina Macedo, Daniela Konkevitz, Danielle Vita, Fabrícia Barbosa, Fernanda Chula, Fernanda Bruck, Fernanda Souza, Gabriela Schirmann, Gisele Marinho, Glaucia Bernal, Ivone Rodrigues, Jyana Morais, Liliane Sartori, Lisa Engelmann, Lívia Lima, Luciana Dantas, Luzia Barbosa, Maria Batista, Melissa Araujo, Milene Pinto, Neíse Magalhães, Priscila Gomes, Rafaela Santos, Suellen Azevedo, and Thaís Michelini.

Participating nephrologists:

Laís Peralva, Sebastião Ferreira, Gustavo Silva, Leidson Alkimin, Roberto Sallum, Homero Agra, Domingos D'Avila, Ângela Uglione, Maria Bandeira, Francisco Vasconcelos, Lucia Oliveira, Juliane Lauor, Kenedy Oliveira, Nilo Hoelfelmann, Hélio Teixeira, Aluizio Silva, Sebastião Ferreira, Washington Correia, Eduardo Silveira, Cleonice Pereira, Elvino Barros, Fernando Thomé, Paulete Grando, José Almeida, Maria Cecília Damasceno, Jacqueline Caramori, Fabrício Caíres, Marcos André Viana, Itamar Vieira, Paulo Roberto Faroco, Antonio Inda Filho, Tatiana Carneiro, Maria Eliete Pinheiro, Ana Katarina Lopes, Mario Antonio Macedo, Elzo Ribeiro Junior, Aba Regina Brandão, Marcos Scheidemamtel, Pedro Paulo Resende, and Lucíola Carneiro.

Participating dialysis centers:

AL: Clinica Renal do Hospital Ortopédico de Maceió; AM: Centro de DRC; DF: Soclimed, Centro Brasiliense de Nefrologia, SOS Intensimed Assistência Médica; GO: Clinica Renal de Luziânia; MG: Centro de Tratamento de DRC, Centro de Diálise do Hospital Santa Casa de BH, Nefron Ltda, Unidade de Nefrologia do Hospital São João de Deus, Centro de Tratamento Renal Irmandade Nossa Senhora da Conceição, Serviço de Hemodiálise FAEPU-UFU, CTDR, Centro Nefrológico de MG Ltda, Centro de Nefrologia e Hemodiálise da Fundação de Saúde Dílson de Quadros Godinho, Clínica Nefrológica de MG, Associ São Vicente de Paula de João Monlevade; MT: Centro Nefrológico de Cuiabá; PR: Unirim, Renalclin; RJ: CDR - Clínica de Doenças Renais, Renalle; RN: Clínica do Rim Ltda, Instituto do Rim, Nefron Clínica; RS: Nefroclin, Serviço de Nefrologia do Hospital São Lucas da PUC, Nefrocor, Instituto de Doenças Renais; SC: Fundação Pro Rim, Associação Renal Vida, Clínica de Nefro Joinville; SP: Unasco, Unidade de Diálise do HC Botucatu, CINE, HDC.

References

1. Sociedade Brasileira de Nefrologia. Disponível em: URL: http://www.sbn.org.br.
2. Sesso R, Lopes AA, Thomé FS, Bevilacqua JL, Romão Jr JE, Lugon J. Relatório do Censo Brasileiro de Diálise, 2008. J Bras Nefrol 2008;30:233-8.
3. Cabral PC, Diniz AS, Arruda IKG. Avaliação nutricional de pacientes em hemodiálise. Rev Nutr 2005;18:29-40.
4. Valenzuela RGV, Giffoni AG, Cuppari L, Canziani MEF. Estado nutricional de pacientes com insuficiência renal crônica em hemodiálise no Amazonas. Rev Assoc Med Bras 2003;49:72-8.
5. Cardozo MT, Vieira IO, Campanella LCA. Alterações nutricionais em pacientes renais crônicos em programa de hemodiálise. Rev Bras Nutr Clin 2006;21:284-9.
6. Ribeiro MMC, Araújo ML, Netto MP, Cunha LM. Impacto do hábito de jantar sobre o perfil dietético de pacientes em hemodiálise. J Bras Nefrol 2011;33:69-77.
7. Agência Nacional de Vigilância Sanitária (Brasil). Resolução nº 154, de 15 de junho de 2004. Regulamento Técnico para o Funcionamento dos Serviços de Diálise. Diário Oficial da União, 17 de junho de 2004.
8. Martins C, Riella MC. Nutrição e Hemodiálise. In: Riella MC, Martins C. Nutrição e o Rim. Rio de Janeiro: Guanabara Koogan; 2001.
9. Sampaio IBM. Estatística Aplicada à Experimentação Animal. 2ª ed. Belo Horizonte: FEPMVZ-Editora; 2002. p.265 Ilust.
10. World Health Organization. Physical Status: the use e and interpretation of anthropometry. Geneve: WHO; 1995.
11. World Health Organization. Obesity: Preventing and managing the global epidemic. Geneve: WHO; 1997.
12. Sposito AC, Caramelli B, Fonseca FAH, Bertolami MC, Afiune Neto A, Souza AD, et al. IV Diretriz Brasileira sobre Dislipidemias e Prevenção da Aterosclerose: Departamento de Aterosclerose da Sociedade Brasileira de Cardiologia. Arq Bras Cardiol 2007;88:2-19.
13. Fouque D, Vennegoor M, ter Wee P, Wanner C, Basci A, Canaud B, et al. EBPG Guideline on Nutrition. Nephrol Dial Transplant 2007;(suppl 2):ii45-87. Doi:10.1093/ndt/gfm020.
14. Sesso RC, Lopes AA, Thomé FS, Lugon JR, Burdmann EA. Censo Brasileiro de Diálise, 2009. J Bras Nefrol 2010;32:380-4.
15. Vigilância de fatores de risco de proteção para doenças crônicas por inquérito telefônico, VIGITEL 2010. Disponível em: URL: http://portal.saude.gov.br/portal/arquivos/pdf/vigitel_180411.pdf.
16. Lipschitz DA. Screening for nutritional status in the elderly. Primary Care 1994;21:55-67.
17. Koople JD, Zhu X, Lew NL, Lowrie EG. Body weight-for-height relationships predict mortality in maintenance hemodialysis patients. Kidney Int 1999;56:1136-48.

18. Pifer TB, McCullough KP, Port FK, Goodkin DA, Maroni BJ, Held PJ, et al. Mortality risk in hemodialysis patients and changes in nutritional indicators: DOPPS. Kidney Int 2002;62:2238-45.
19. Cuppari L, Kamimura MA. Avaliação nutricional na doença renal crônica: desafios na prática clínica. J Bras Nefrol 2009;31:28-35.
20. Seidell JC, Kahn HS, Williamson DF, Lissner L, Valdez R. Report from a Centers for Disease Control and Prevention Workshop on use of adult anthropometry for public health and primary health care. Am J Clin Nutr 2001;73:123-6.
21. Han TS, Van Leer EM, Seidell JC, Lean ME. Waist circunference action levels in the identification of cardiovascular risk factors: prevalence study in a random sample. BMJ 1995;311:1401-5.
22. Sampaio LR. Avaliação nutricional e envelhecimento. Rev Nutr 2004;17:507-14.
23. Perissinotto E, Pisent C, Sergi G, Grigoletto F; ILSA Working Group (Italian Longitudinal Study on Ageing). Anthropometric measurements in the elderly: age and gender differences. Br J Nutr 2002;87:177-86.
24. Batista M, Rodrigues CJO. Alterações metabólicas. J Bras Nefrol 2004;26:15-9.
25. Foley RN, Parfrey PS, Sarnak MJ. Clinical epidemiology of cardiovascular disease in chronic renal disease. Am J Kidney Dis 1998;32:112-9.
26. US Renal Data System. Mortality and causes of death. In: Annual Data Report: Atlas of end-stage renal disease in the United States, USRDS 2002. Bethesda: National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases; 2002. p. 467-88. Disponível em: URL: http://www.usrds.org/atlas_2002.htm.
27. Santos NSJ, Draibe AS, Kamikura MA, Cuppari L. Albumina sérica como marcador nutricional de pacientes em hemodiálise. Rev Nutr 2004;17:339-49.

Volume 34 Edição 3 - Jul/Set 2012

ASPECTOS NUTRICIONAIS E EPIDEMIOLÓGICOS DE PACIENTES COM DOENÇA RENAL CRÔNICA SUBMETIDOS A TRATAMENTO HEMODIALÍTICO NO BRASIL, 2010

NUTRITIONAL AND EPIDEMIOLOGICAL ASPECTS OF PATIENTS WITH CHRONIC RENAL FAILURE UNDERGOING HEMODIALYSIS FROM BRAZIL, 2010

Bárbara Margareth Menardi Biavo, Carmen Tzanno Branco Martins, Lucas Maciel Cunha, Melissa Luciana de Araujo, Márcia Machado Cunha Ribeiro, Anita Sachs, Clarissa Baia Bargas Uezima, Sérgio Antonio Draibe, Cibele Isaac Saad Rodrigues, Elvino José Guardão Barros

O nome foi publicado como Carmen Tzanno Branco Martins e o correto é Carmen Tzanno-Martins.