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Nutritional Assessment of Hemodialysis Patients Aged Over 65 Years: Outcome of a Cross-Sectional Survey Conducted in the Well-Equipped Hemodialysis Center of the Cahors Hospital

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Abstract

Elderly hemodialysis patients particularly suffer from protein-energy wasting syndrome due to age-related physiological changes. We carried out an observational study from 1 to 30 April 2016 involving 31 elderly hemodialysis patients in the center of Cahors University Hospital. We intended to check how close the 3 methods of nutritional evaluation were, namely ingesta, albumin/prealbumin association and Subjective Global Assessment. We trialed the nutritional status of each patient using the above methods.

The mean age was 77.7 ± 7.07 years with M/F ratio of 0.63. Exposure to dialysis was 40.61 ± 67.88 months on average. The mean BMI was 26.67 ± 9.17 kg/m^2. The average daily calorie and protein intake was 1297.61 ± 321.73 Kcal and 52.87 ± 9.89 g, respectively. The average branchial perimeter was 27.53 ± 2.47 cm with a mean triceps skinfold of 9 ± 0.7. The daily protein intake assessed by the nPCR was 0.95 ± 0.21 g/kg/day. The mean albumin and pre-albumin levels were 37.32 ± 1.41 g/l and 283.22 ± 35.35 mg/l. The average Kt/V was 1.98 ± 0.35. According to the SGA, 26 (83.87%) were in good nutritional status (subgroup 1), 3 (9.67%) were suffering from mild undernutrition (subgroup 2) and 2 (6.46%) had acute undernutrition (subgroup 3). Relying on albumin and pre-albumin levels, 18 (58.06%) were in good nutritional status, 6 (19.36%) had mild undernutrition and 7 (22.58%) acute undernutrition. According to the ingesta, 2 (6.46%) patients were in subgroup 1, 8 (25.81%) patients in subgroup 2 and 21 (67.74%) in subgroup 3. No agreement was found between the 3 evaluators of nutritional status (kappa to assess SGA and albumin-pre-albumin association at -0.075 [95% confidence interval: -0.175 to 0.024]; kappa as a measurement for SGA and ingesta at 0.073 [95 % range: -0.007 to 0.153], kappa for albumin-pre-albumin combination and ingesta at 0.034 [95% confidence interval: -0.058 to 0.126]).

Disjunction between the three nutritional evaluators used in our study, in addition to inherent bias in the low number of staff, provides information on the nutritional problems of elderly hemodialysis patients, especially underestimation of nutritional surveys in relation to actual energy intake, nutritional impact of the physiological and socio-economic changes that accompany aging and the lack of nutritional methods and standards specific to this category of population.

Keywords: Ingesta; SGA; Albumin/prealbumin association; Age

Introduction

The rate of elderly people in general keeps growing. According to INSEE projections, in 2040, a quarter of the French population will be over 65. This trend can now been noticed in the dialysis population in Europe, as evidenced by the 2013 ERA-EDTA report, where 55% of patients starting dialysis are older than or equal to 65 years [1]. The physiological degradation that goes with aging, particularly sarcopenia, alteration of digestive and dental capacities, loss of the sense of smell and taste, really expose to the risk of undernutrition [2-5]. In addition, psychosocial disorders, cognitive disorders in particular, affect approximately 37% of elderly patients under dialysis [6]. As proof, 10% of elderly people living in seniors' homes and 35% living in healthcare institutions in Europe, get lower protein diet than the minimum necessary to keep muscle integrity: 0.7 g/kg / day [7]. This physiological and psychosocial vulnerability differentiates them from young dialysis patients. The prevalence of protein-energy malnutrition is highly variable in this group of patients, ranging from 26% to 77% [8]. This deviation is linked to a lack of consensus on the definition and evaluation methods of the protein-energy wasting syndrome [9]. We conducted a cross-sectional study at the Cahors Hospital Center, aiming at comparing three ways of evaluating nutrition: ingesta, albumin and Subjective Global Assessment (SGA).

Patients and Methods

This is a one-month cross-sectional and observational study (1-30 April 2016) involving 31 patients under hemodialysis in Cahors hospital.

All patients aged 65 at least who had been treated at the hemodialysis center for more than 6 months were included. Patients receiving auto-dialysis were excluded. Similarly, patients with liver disease, sepsis, hypogammaglobulism, dementia were not concerned. There was agreement, so the local ethics committee validated the work.

The purpose of the study is to define the quality of the match between ingesta and albumin-pre-albumin association with SGA composite score.

It took the dietician of the dialysis center 3 consecutive days to assess ingesta. The "CIQUAL" food composition table was used to evaluate calorie and protein food equivalents.

We defined 3 subgroups according to the results of ingesta:

Subgroup 1: calorie intake ≥ 30 kcal /kg/day and protein intake ≥ 1.2 g/kg/day

Subgroup 2: calorie intake between 25 and 30 kcal/kg/day and protein intake between 1 and 1.2 g/kg/day

Subgroup 3: calorie intake ≤ 25 kcal/kg/day and protein intake ≤ 1 g/kg/day

With biological data including albumin and pre-albumin, we determined 3 subgroups with 2 levels of malnutrition:

Subgroup 1: albumin ≥ 38 g/l and pre-albumin ≥ 300 mg/l (relevant nutritional status)

Subgroup 2: albumin between 35 and 37 g / l and pre-albumin between 200 and 300 mg / l (mild malnutrition)

Subgroup 3: albumin ≤ 35 g/l and pre-albumin ≤ 200 mg/l (acute malnutrition).

Blood samples were taken at the beginning of dialysis except for urea. The following parameters were studied: urea before and after for the calculation of nPCR and Kt/V, albumin, pre-albumin, CRP, NFS, ferritinemia, CST, serum iron, alkaline reserves. Albumin was measured by the bromcresol green method. Daugirdas II formula was used for the calculation of Kt/V.

The Subjective Global Assessment (SGA) was carried out by a permanent nephrologist at the dialysis center relying on the following features: percentage of weight change 6 and 3 months before the assessment, the diet, gastrointestinal symptoms, functional discomfort and clinical examination including adipose tissue and lean body mass. At the end of his examination, he checked a category of SGA: A: good nutrition; B: moderate to mild malnutrition; C: acute malnutrition.

The collection of anthropometric data was done by the same person. The MUAC was measured using a tape measure at mid-height between the acromion and the olecranon of the right or left arm depending on whether the patient was right-handed or left-handed. Triceps skinfold (TSF) was measured using a Harpenden-type forceps at the posterior section of the arm midway between the acromion and the olecranon.

The comorbidities were assessed using the Charlson scale.

"Anorexia of aging" was searched using the following 5 items: very good, good, average, bad and very bad.

Data are expressed as mean ± standard deviation, minimum, maximum, and percentage based on variables. The comparisons between the nutritional status groups evaluated by SGA were made by the kruskal-wallis test for categorical variables and by the ANOVA for continuous variables. The kappa test was applied to measure the match between SGA, albumin associated with pre-albumin and ingesta for the diagnosis of protein-energy wasting syndrome. All results were deemed significant if P <0.05.

Results

The mean age was 77.7 ± 7.07 years with an M/F ratio of 0.63. The average length of dialysis treatment was 40.61 ± 67.88 months. 26 patients were in post-dilution haemodiafiltration, 5 in conventional hemodialysis. The average BMI was 26.67 ± 9.17 kg/m2. 74.2% (n = 17) of patients had atleast 3 comorbidity score.

	N = 31 N (%)
Sex	
Male	12 (41.94%)
Female	18 (58.06%)
Âge	
Mean ± SD	77.7 ± 7.07
Min – Max	65 - 96 years
Length of Hemodialysis treatment	
Mean ± SD	40.61 ± 67.88 months
Min – Max	6 – 144 months
BMI	
Mean ± SD	26.67 ± 9.17
Min – Max	18 – 45.14
Number of comorbidities	
1	0 (0%)
2	8 (25.8%)
3	9 (29.03%)
4	4 (12.92%)
≥5	10 (32.25%)
Caloric intake (Kcal)	
Mean ± SD	1297.61 ± 321.73
Min - Max	741 – 2150
Protein intake (g/l)	
Mean ± SD	52.87 ± 9.89
Min –Max	28.5 – 105
Albumin	
Mean ± SD	37.32 ± 1.41

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Min – Max	30 – 43
Mean (cm)	
Mean ± SD	27.53 ± 2.47
Min – Max	19 – 37
Triceps skinfold	
Mean ± SD	9 ± 0.70
Min –Max	3.8 – 17.4
nPCR	
Mean ± SD	0.95 ± 0.21
Min – Max	0.7 – 1.3
Kt/V	
Mean ± SD	1.98 ± 0.35
Min – Max	1.2 – 2.4
CRP (mg/l)	
Mean ± SD	4.83 ± 0.70
Min – Max	2 – 14
Hemoglobin (g/dl)	
Mean ± SD	11.32 ± 0.70
Min – Max	9.2 – 13.6
Alkaline reserve (mmol/l)	
Mean ± SD	24.29 ± 0.70
Min – Max	20 – 28
Ferritinaemia (µg/l)	
Mean ± SD	261.7 ± 48.08
Min – Max	18 – 836
Transferrin saturation coefficient (%)	
Mean ± SD	20.77 ± 3.53
Min – Max	8 - 42
Serum iron (µmol/l)	
Mean ± SD	10.18 ± 2.33
Min – Max	4.8 – 20.3
Prealbumine (mg/l)	
Mean ± SD	283.22 ± 35.35
Min – Max	110 - 440
Mean ± SD: Mean ± Standard Deviation Min –Max : Minimum – Maximum	

Table 1: Demographic, clinical, biological and dietary characteristics.

Mean daily calorie and protein intake was 1297.61 ± 321.73 Kcal and 52.87 ± 9.89 g, respectively. The average branchial perimeter was 27.53 ± 2.47 cm with a mean triceps skinfold of 9 ± 0.7. The daily protein intake assessed by the nPCR was 0.95 ± 0.21 g/kg/day. The mean albumin and pre-albumin levels were 37.32 ± 1.41 g/l and 283.22 ± 35.35 mg/l. The average Kt/V was 1.98 ± 0.35 (Table 1).

According to SGA, 26 (83.87%) patients were classified in category A, 3 (9.67%) in category B and 2 (6.46%) in category C. According to albumin and pre-albumine levels, 18 (58.06%) patients were in subgroup 1, 6 (19.36%) in subgroup 2 and 7 (22.58%) in subgroup 3. According to ingesta, 2 (6.46%) patients were in sub -group 1, 8 (25.81%) patients in subgroup 2 and 21 (67.74%) in subgroup 3 Figure 1. No agreement was found between the 3 assessors of nutritional status (kappa as a standard measurement for SGA and the albumin-pre-albumin combination at -0.075 [95% confidence interval: -0.175 to 0.024], kappa for SGA and ingesta at 0.073 [95% confidence interval: 0.007 to 0.153], kappa for albumin - pre-albumin association and ingesta at 0.034 [95% confidence interval: - 0.058 to 0.126]).

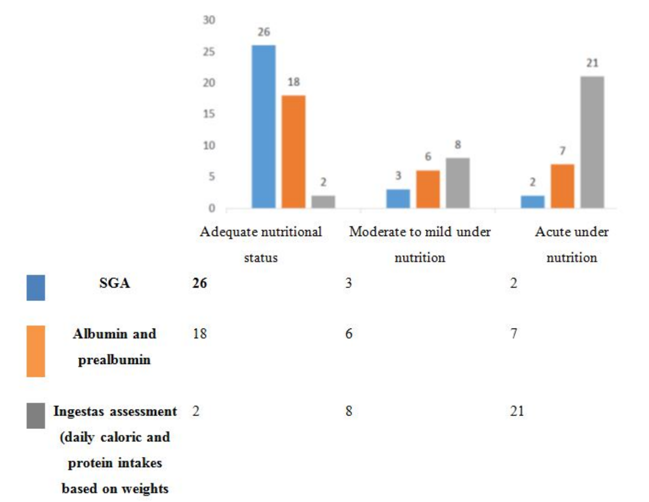

Figure 1: Nutritional status distribution according to the 3 nutritional assessors.

Among the 26 patients in SGA Category A, 73.04% had a daily protein and caloric intake less than or equal to 25 Kcal/kg/day and 1 g/kg/day, respectively. 57.69% had albumin and pre-albumin levels greater than or equal to 38 g/l and 300 mg/l, respectively. The appetite level was average in 45.16%, good in 32.25% (Table 2).

	Subjective Global Assessment			**P value**
Variables	Category A n = 26	Category B n = 3	Category C n = 2	
Âge	77.88 ± 1.41	74.33 ± 6.36	80.5 ± 6.36	0.70
Male (n [%])	8 (30.76%)	1 (33.33%)	1 (50%)	0.85
Female (n [%])	18 (69.23%)	2 (66.67%)	1 (50%)	
Calorie intake (Kcal/kg/day)	20.71 ± 2.97	23.22 ± 0.53	23.38 ± 8.27	0.73
Protein intake (g/kg/day)	0.86 ± 0.02	0.82 ± 0.04	0.92 ± 0.34	0.95
Albumin (g/l)	37.38 ± 3.53	39.33 ± 4.94	38 ± 7.07	0.67

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Prealbumin (mg/l)	284.61 ± 63.63	310 ± 35.35	225 ± 162.63	0.59
Kt/v	1.96 ± 0.49	2.06 ± 0.14	2.15 ± 0.21	0.73
Hemoglobin (g/dl)	11.36 ± 0.7	10.86 ± 1.48	11.45 ± 1.76	0.74
CRP (mg/l)	5.03 ± 1.41	4.66 ± 1.41	2.5 ± 0.7	0.41
Alcaline reserve (mmol/l)	24.38 ± 2.12	24 ± 1.41	23.5 ± 0.70	0.81
Ferritin (µg/l)	258.11 ± 56.56	337.66 ± 543.05	194.5 ± 184.55	0.76
Serum iron (µmol/l)	10.60 ± 5.51	9.2 ± 1.27	6.25 ± 1.20	0.29
BMI (Kg/m2)	26.89 ± 7.74	24.57 ± 2.96	21.38 ± 3.16	0.38
Length of dialysis treatment (Months)	43.11 ± 59.39	18 ± 0	24 ± 8.48	0.49
Branchial perimeter (cm)	28.36 ± 6.71	25.5 ± 3.18	19.75 ± 1.06	0.03
Triceps skinfold	9.57 ± 6.64	7.4 ± 1.13	3.9 ± 0.14	0.04
CST (%)	21.80 ± 9.89	18.33 ± 0.70	11 ± 2.82	0.12
Weight (kg)	65.76 ± 23.26	58.26 ± 3.81	40.25 ± 5.02	0.05
Very good appetite (n [%])	3 (9.67%)	0 (0%)	0 (0%)	0.08
Good appetite (n [%])	10 (32.25%)	0 (0%)	0 (0%)	
Average appetite (n [%])	14 (45.16%)	2 (6.45%)	1 (3.23%)	
Poor appetite (n [%])	0 (0%)	0 (0%)	1 (3.23%)	
Mean ± SD: Mean ± Standard Deviation				

Table 2: Relationship between the different nutritional categories assessed using SGA and demographic, dietary, clinical and biological data.

Only weight, MUAC, and triceps skinfold were significantly correlated with the different nutritional statuses assessed by SGA (Table 2).

Comment

Discrepancy between the 3 nutritional assessors used in our study, in addition to the bias inherent in the weakness of our workforce, provides information on the nutritional issues of elderly dialysis patients. Given the scarce nutritional studies in this patient group and the lack of clear recommendations clinically, the practice would be, and still is, to use the same methods and standards as those applied for young dialysis patients. However, the physiological and psycho-social changes that accompany aging draws a basic distinction between them. To overcome such difference, two recently published journals have made recommendations by reviewing the particularities of aging, including the socio-economic changes referred to as the "Nine Ds"; e.g. including teething, dyspepsia, dysphagia, diarrhea, depression, dementia, medication, illness, dysfunction; sarcopenia very often associated with low physical activity; and on top of these, fragility, which is defined as the cumulative deterioration of several physiological systems leading to a decrease in homeostatic reserve and lesser ability to cope with stress [9,10]. Six screening tools for frailty were tested in elderly dialysis patients with sensitivity ranging from 48 to 88% [11]. Their use in clinical practice is of paramount importance as it would allow the selection of patients at high risk of undernutrition and grant access to thorough geriatric assessment.

In our study, 93.54% of patients had intakes below the 30 Kcal/kg/day as recommended by KDOQI [12]. And yet, according to the Subjective Global Assessment (SGA), certainly a good indicator of nutritional status in elderly dialysis patients [13], only 16.12% were affected by undernutrition. These results reflect the limitations that the food survey may have. In fact, a study conducted in 13 young stable hemodialysis patients (mean age of 47.7 ± 9.7 years) had shown that the evaluation of ingestas significantly underestimates patients' energy intake [14]. In addition, memory and eyesight problems can also negatively impact the food survey. In the absence of infectious or inflammatory conditions, the nPCR remains a good tool to assess protein intake despite the fact that it cannot tell us about the quality of proteins and dietary habits. Given all these limitations, it is advisable for elderly people to have the food survey done with the help of accompanying adults by specifying the frequency of meals, portion size, food preferences and dietary consistency. In addition, the nutritional needs of the elderly are considered to be about -20% lower due to physical inactivity and lean body mass loss among other factors. Furthermore, there is a direct and independent correlation between energy intake and GFR level [15]. A recent study on 13 clinically stable sedentary young hemodialysis patients receiving a constant energy intake showed that daily average energy requirements were 31 ± 3 kcal/kg / day with very high variability ranging from 26 to 36 kcal/kg /day [16]. These results confirm the 35 Kcal/kg/day in patients under 60, as per KDOQI guidelines. On the other hand, the 30 Kcal/kg/day recommended for elderly hemodialysis patients remains to be confirmed. A personalized nutritional assessment should be made by calculating resting energy expenditure using equations validated with a corrective factor taking into account the level of physical activity and possible aggressions likely to increase energy expenditure [17,18].

It is known that there is a strong and inverse association between the level of albuminemia and a high risk of morbidity and mortality [19]. Although lower albumin levels are assumed in the elderly, two studies comparing the nutritional status of young and elderly dialysis patients did not find a significant association between age and level of albuminemia [20,21]. An observational study in chronic hemodialysis patients over 75 has demonstrated that a decrease or increase of 0.1 g/dl of albumin over one year was associated with poor survival compared to patients whose albumin level remained unchanged for one year and with serum albumin greater than 38 g/l. As for pre-albumin too, it is shown that a rate below 300 mg/l is associated with cumulative survival of less than 10 years [22].

Difficulties related to teething such as chewing problems, poorly adapted dental prosthesis must be taken into consideration in nutritional care. As well as the problems related to social and clinical conditions including low economic income, social isolation, limitation in the acquisition and preparation of meals, polypharmacy that can hinder food intake and comorbidities [9].

Physiological changes in body composition related to aging may distort anthropometric parameters. They often have more skin especially in the arms which should not be confused with fat or muscle. The width of the calf makes it possible to assess muscle mass [9]. For the calculation of BMI, knee height can help readjust the deviation in size inherent to aging [9].

Conclusion

Elderly hemodialysis patients are vulnerable. They are really malnourished, therefore nutritional assessment methods used in the young dialys can be applicable to them subject to a precise adaptation to physiological and socio-economic changes inherent to aging. The use of frailty screening tools should be systematic to identify at-risk patients who require further geriatric evaluation.

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