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Epidemiological, Clinical and Prognostic Profile of Malnutrition in Chronic Renal Failure Patients Prior to Dialysis

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Abstract

Introduction: Nutritional requirements are all the more important as food intake is reduced as renal failure progresses, due to a number of factors. Undernutrition is caused by an imbalance between insufficient nutritional intake and increased catabolism and needs. It occurs in 23% of patients with chronic kidney disease prior to dialysis. The aim was to determine the prevalence of undernutrition in non-dialyzed CKD patients. **Patient and Methods:** The study was conducted in the nephrology department of Donka Hospital. It was a descriptive and analytical cross-sectional study over a period from October 1st to December 31st, 2018. Patients with chronic renal failure who were malnourished and not put on hemodialysis were included in this study. The variables were epidemiological, clinical and evolutionary; nutritional status was assessed taking into account BMI, SGA. Data analysis was performed in SPSS v20. **Results:** The incidence of undernutrition was 48.53%. The 45 - 55 age group was the most affected, at 22.06%, with an average age of 45.29 ± 15.42 years. The study revealed a male predominance of 54.41%, with a sex ratio of M/F = 1.19. Unfavorable socio-economic status was the most common, at 84%. Class A of the APG score was the most represented, with a proportion of 51.47%. Patients with a BMI < 16 were less represented, with a proportion of 19.12%. Multivariate analysis revealed a correlation between low caloric and lipid intake and the onset of undernutrition, with a p-value of < 0.001. Mortality in this series was 10.29%. **Conclusion:** Undernutrition is a major factor in morbimortality in CKD patients; collaboration between nephrologists and dieticians is needed to improve the quality of life of patients suffering from chronic kidney disease.

Keywords

Undernutrition, CKD, Morbimortality

1. Introduction

Nutritional requirements are all the more important as food intake is reduced as renal failure progresses, due to a number of factors [1].

Undernutrition is secondary to an imbalance between insufficient nutritional intake and increased catabolism and requirements [2].

It occurs in 23% of patients with chronic renal failure prior to dialysis, and 1/3 of these patients, regardless of disease progression, have high morbidity and mortality [3] [4]. Effective nutritional interventions improve survival in patients with chronic renal failure [5].

Undernutrition is not very symptomatic, and is encountered in 20% - 70% of patients suffering from chronic kidney disease, depending on the degree of progression of the disease [6].

In the absence of a single, ideal nutritional marker, it is the combination of several clinical, biological and possibly biophysical criteria that enable the diagnosis of undernutrition, and prescriptions must take account of the stage of chronic renal failure [7].

The literature reports that a 1 g/l drop in albuminemia is associated with a 5% reduction in mortality per year and a 30 g/l increase in prealbuminemia after three months of nutritional intervention is associated with a 60% reduction in mortality [5].

More recent studies have shown a high prevalence of undernutrition in people aged over 50 [5].

In France, in a national cooperative study involving 7123 patients, malnutrition was found in 36% of patients [2].

In Morocco, in the ES-SEBBANI study, the prevalence of undernutrition was 37% [8].

In Nigeria in 2016, Adejuma and al found a prevalence of 46.7% in pre-dialysis chronic kidney disease patients [9].

In Guinea in 2010, a doctoral thesis by CAMARA on the nutritional status of hemodialysis patients found a 54.76% prevalence of undernutrition [10].

The aim of this study was to determine the frequency, clinical aspect and evolution of undernutrition in patients with chronic renal failure prior to dialysis.

2. Materials and Methods

The nephrology department of the Donka National Hospital served as the setting for this study. It was a descriptive and analytical cross-sectional study covering a three-month period from October 1 to December 31, 2022. Recruitment was exhaustive, and included all patients with chronic renal failure not on hemodialysis followed in the department during the study period. Non-hemodialyzed chronic renal failure patients who agreed to be included in the study and who were declared malnourished, regardless of sex, age or profession, were included in the study. Those who were not malnourished and patients already on dialysis were not included in this study.

The sample size was obtained after counting.

Epidemiological data will include: frequency of undernutrition; age; gender; occupation; this occupation has been divided into formal sector to designate civil servants; informal sector for shopkeepers and workers, housewives; pupils/students.

Unfavourable socio-economic status was retained in this study according to the following criteria:

No permanent job or retired, no health coverage, monthly income insufficient to cover basic needs, living in rented accommodation.

Clinical data, certain factors will be researched: antecedents (hypertension, diabetes mellitus, HIV, tuberculosis, heart disease, viral hepatitis, etc.); socio-economic conditions: Unfavorable for patients with no health insurance and who have difficulties in accessing care; favorable for patients with no difficulties in accessing care and who are able to pay for check-ups and prescriptions; initial nephropathy according to anatomoclinical classification into Vascular Nephropathy (history of hypertension, Pu between 1 and 1.5 g/l, FO showing hypertensive retinopathy) Glomerular Nephropathy (Pu greater than 1.5 g/l); NTIC (low Pu, leukocyturia, germ-free ECBU); Diabetic Nephropathy (Diabetes over 5 years, albuminuria, FO showing diabetic retinopathy).

The diagnosis of undernutrition was based on the subjective global assissent score (SGA) and BMI classification. The GAS was developed by Baker *et al.* and adapted for CKD patients, taking into account only data from the interview and physical examination. It has been shown that nutritional status, as assessed by the APG, correlates well with morbidity and mortality in CKD patients, after adjustment for age, diabetes, cardiovascular disease and albumin levels [3] [8] [11].

The SGA score is a method of assessing nutritional status based on objective criteria (age, sex, weight, height, skinfolds, BMI, albumin, protein) and subjective criteria (anamnestic data, weight loss, eating habits, gastrointestinal symptoms)

The APG takes three classes into account:

Class A: normal nutritional status defined by the absence of physical signs of undernutrition, significant weight loss, functional discomfort related to nutrition, or gastrointestinal symptoms predisposing to undernutrition.

Class B: Moderate undernutrition defined by a weight loss of 5 to 10% with no tendency to weight gain, associated with slight muscle or subcutaneous fat loss and reduced food intake.

Class C: Severe undernutrition, defined by the presence of physical signs of undernutrition such as loss of subcutaneous adipose tissue, significant muscle atrophy or oedema associated with a continuous weight loss of more than 10% or a reduction in food intake, gastrointestinal symptoms and functional discomfort.

The body mass index will be determined using the following method:

BMI (kg/m^2) = Weight (kg)/Height (m^2) and has been classified into three (3) classes:

Severe undernutrition (BMI < 16)

Moderate undernutrition (18 < IMC ≥ 16)

Normal nutritional status ≥ 18).

Brachial Muscle Circumference (BMC): used to estimate muscle mass; representative of lean mass.

Calf circumference (CM): proposed as a marker in the elderly, was measured on a leg bent at 90˚ on the left side and at the level of the maximum perimeter.

Abdominal perimeter (AP): is measured in the upright position, with the abdomen relaxed, using a tape measure placed horizontally at the level of the umbilicus.

Body fat mass (BFM) is the total amount of fat in the body. It is obtained by summing four (4) skin folds (bicipital, tricipital, subscapular and suprailiac), measured in SGA scores, then applying Durnin and Womersley's formula as follows: MG% = [495/(C-M x log S)-130] [12] [13].

The C and M values for women are:

17 to 19 years C = 1.1549 and M = 0.0678

20 to 29 years C = 1.1599 and M = 0.0717

30 to 39 years C = 1.1423 and M = 0.0632

40 to 49 years C = 1.1333 and M = 0.0612

Over 50s C = 1.1339 and M = 0.0645

The C and M values for humans are:

17 to 19 years C = 1.1620 and M = 0.0678

20 to 29 years C = 1.1631 and M = 0.0632

30 to 39 years C = 1.1422 and M = 0.0644

40 to 49 years C = 1.1620 and M = 0.0700

Over 50s C = 1.1715 and M = 0.0779

Log S = the sum of the four skin folds.

Lean mass (LM): is estimated from the measurement of the brachial muscular circumference obtained by measuring the brachial circumference and the tricipital skinfold on the same arm.

Assessment of patients' dietary intake of proteins, lipids, carbohydrates (expressed in g/kg/day), vitamins (A, D, E, C, B6, B12) and minerals (calcium, potassium, sodium).

Caloric and nutrient intakes were then calculated, and the results compared with reference values to determine whether intake was insufficient, low, increased or hyper. All biological tests were carried out in the Donka Hospital laboratory.

CBC to look for biological signs of infection: hyperleukocytosis if the value is greater than 10,000/mm^3, or leukopenia if the value is less than 4000/mm^3; anemia if the Hb is less than 11 g/dl; thrombocytopenia if the value is less than 150,000/mm^3. CRP in search of an inflammatory syndrome if the value is greater than 7 mg/l; Albuminemia in search of hypoalbuminemia if the value is less than 35 g/l.

Quantitative data were presented as mean ± standard deviation, and qualitative data were described by their numbers, frequencies and 95% frequency confidence intervals. Groups were compared by Pearson's X^2 test or Ficher's exact test when the latter was more appropriate (theoretical number < 5).

Univariate logistic regression was used to estimate the association between undernutrition and the independent variables.

For multivariate logistic regression, only independent variables with a p-value of less than 15% in univariate logistic regression and interactions that were significant at the 5% threshold were included in the final model.

We used the descriptive stepwise method, and the model with the smallest AIC was considered the final model. The Hosmer and Lemeshow test was used to verify model adequacy. Statistical analysis was performed using Epi Info software (version 7.2).

Patients were evaluated after the prescription of appetite stimulants, the recommendation of a protein-rich, vitamin-rich diet.

The limitations of this study were the inaccessibility and high cost of certain complementary tests.

The small sample size makes statistical analysis difficult.

In Guinea, three PhD theses supervised in the nephrology department from 2014 to 2022 show a high frequency of undernutrition among chronic hemodialysis patients, the causes of which remain multifactorial, ranging from undernutrition, a lack of financial resources, social problems, the depressive state linked to chronic kidney disease and the unsuitable diet to which they are subjected in the absence of a nutrition specialist [10]. More than 2/5 of patients come from regions outside Conakry, where they are condemned to live hundreds of kilometers from their families for their therapy, as this is the location of the only public hemodialysis center. The study should help alert the authorities to the need for a solution: offer training grants to students or doctors seeking to specialize in this field, and provide health insurance for chronic illnesses.

3. Results

The incidence of undernutrition was 48.57% out of a total of 140 CKD patients not put on hemodialysis either because of a lack of space in the public center or because of refusal (**Figure 1**).

The 45 - 55 age group was the most affected, at 22.06%, with an average age of 45.29 ± 15.42 years and extremes of 15 and 75 years (**Table 1**).

The study revealed a male predominance of 54.41%, with a sex ratio of M/F = 1.19 (**Figure 2**).

The informal sector was the most represented socio-professional stratum, with a frequency of 45.59% (**Figure 3**).

Unfavorable socio-economic status was the most common, at 84% (**Figure 4**).

Arterial hypertension accounted for 56% of the history/terrain (**Table 2**).

Vascular nephropathy was the most common type of nephropathy, accounting for 82.35% (Table 3).

Class A of the SGA score was the most represented, with a proportion of 51.47% (Table 4).

Patients with a BMI < 16 were less represented, with a proportion of 19.12% (Figure 5).

Most patients (89.70%) did not engage in regular physical activity (Figure 6).

The characteristics of the biological workup in descriptive analysis: the mean Albuminemia value was 39.56 ± 16.63 g/l; the mean Protidemia value was 65.70 ± 16.45 g/l; a biological inflammatory syndrome marked by an elevated CRP with a mean value of 9.43 ± 11.13 mg/l; anemia with a mean of 7.52 ± 1.87 g/dl (Table 5).

Descriptive analysis of dietary parameters: Insufficient energy and protein intake in these patients, with mean values of 2465.84 ± 1299.52 Kcal/d and 73.97 ± 30.58 g/l respectively (Table 6).

Descriptive analysis of nutritional intake by SGA class showed moderate undernutrition (Class B) in 33.83% and severe undernutrition (Class C) (Table 7).

Univariate and multivariate analysis of nutritional parameters showed a statistical relationship between undernutrition, cholesterol, calories, carbohydrates and lipids (Table 8 and Table 9).

Mortality in this series was 10.29% (Table 10).

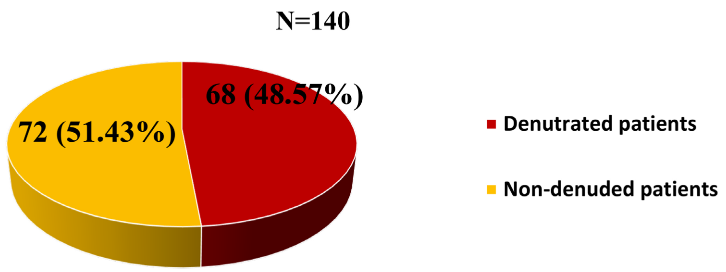

Figure 1. Frequency of undernutrition in CKD and non-hemodialysis patients during this study period.

Table 1. Distribution of non-hemodialysed CKD patients with malnutrition by age group.

Age range	Workforce	Percentage
[15 - 25[	7	12.42
[25 - 35[	10	14.71
[35 - 45[	14	20.59
[45 - 55[	**15**	**22.06**
[55 - 65[	13	19.12
65 and over	9	13.24
Total	68	100

Mean age = 45.29 ± 15.42 years; Extreme: 15 years and 75 years.

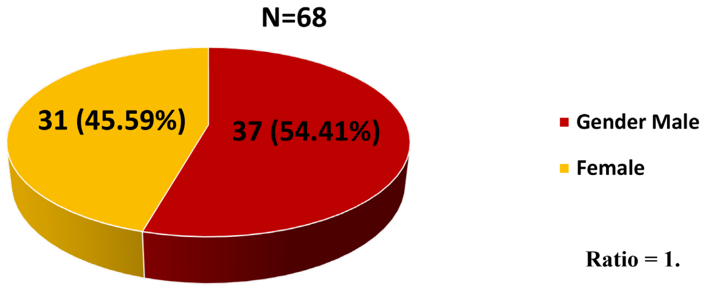

Figure 2. Distribution of non-hemodialysed, malnourished CKD patients by gender.

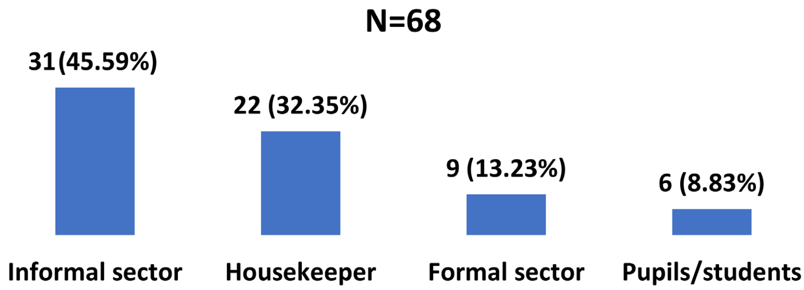

Figure 3. Distribution of non-hemodialysed, malnourished CKD patients by socio-professional strata.

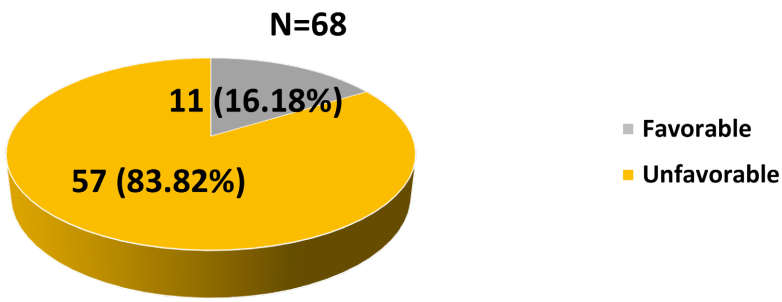

Figure 4. Distribution of non-hemodialyzed, malnourished CKD patients by socio-economic status.

Table 2. Distribution of non-hemodialyzed, malnourished CKD patients by history and terrain.

ATCD/TERRAIN	Workforce	Percentage
HTA	56	82.35
Sweet Diabetes	12	17.65
HIV	4	5.88
Heart disease	3	4.41
Viral Hepatitis B	3	4.41
Pulmonary tuberculosis	3	4.41
Deep Vein Thrombosis	1	1.47

Table 3. Distribution of non-hemodialyzed, malnourished CKD patients by type of kidney disease.

Initial kidney disease	Workforce	Percentage (%)
Vascular Nephropathy	56	82.35
Glomerular nephropathy	6	8.82
Diabetic nephropathy	3	4.41
Tubulointerstitial nephropathy	3	4.41
Total	68	100

Table 4. Distribution of non-hemodialyzed, malnourished CKD patients according to APG Score.

APG score	Workforce	Percentage (%)
Class A	35	51.47
Class B	23	33.82
Class C	10	14.71
Total	68	100

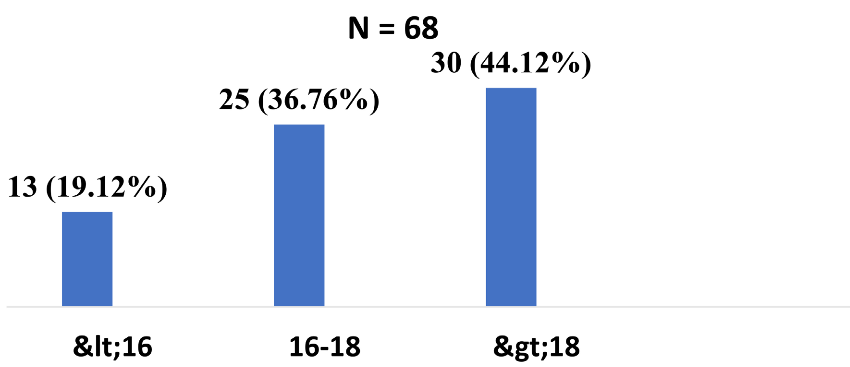

Figure 5. Distribution of undernourished and non-dialyzed chronic renal failure patients according to body mass index (BMI).

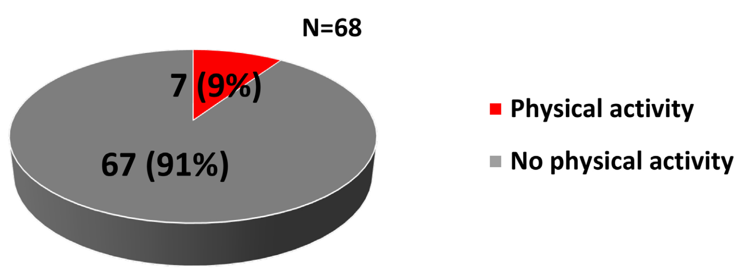

Figure 6. Distribution of non-hemodialyzed, malnourished CKD patients by physical activity level.

Table 5. Distribution of non-hemodialyzed, malnourished CKD patients according to the biological workup performed.

Biological parameters	Mean ± Standard deviation	Minimal	Maximum
Albumin levels (g/l)	39.56 ± 16.63	14	83
Protidemia (g/l)	65.70 ± 16.45	16.5	97
CRP (mg/l)	9.43 ± 11.13	4	80
Leukocytes (cells/mm^3)	7045.59 ± 2458.40	1000	15,000
Lymphocytes (cells/mm^3)	3357.06 ± 2458.18	1000	10,000
Hb (g/l)	7.52 ± 1.87	4	12
Reticulocyte (cells/mm^3)	30007.06 ± 12679.12	2300	95,000

Table 6. Distribution of non-hemodialyzed, malnourished CKD patients according to food intake.

Dietary parameters	Mean ± Standard deviation	Minimal	Maximum
Energy (Kcal/d)	2465.84 ± 1299.52	268	4625
Protein (g/l)	73.97 ± 30.58	10	162
Lipids (g/l)	108.12 ± 50.63	3	184
Carbohydrate (g/l)	306.75 ± 203.30	48	682
Vit E (mg/d)	22.32 ± 97.17	0	810
Vit D (µg/d)	1246.92 ± 16.13	5	5214
Vit C (mg/d)	178.03 ± 206.48	0.2	1254
Vit B6 (mg/d)	4.96 ± 4.29	0	18.5
Vit B12 (µg/d)	79.13 ± 89.99	0	310.23
Calcium (mg/d)	759.32 ± 498.64	72.13	1855
Sodium (mg/d)	2991.14 ± 2474.68	110.44	8622.29
Sugar (g/d)	64.00 ± 38.85	2.89	133.45
Water (ml/d)	4446.38 ± 6774.07	1000	44127
Vegetable oil (g/dr)	6.88 ± 4.31	0.14	15.59

Table 7. Descriptive analysis of nutritional intake by SGA class.

Dietary parameters	Class A	Class B	Class C
Energy intake Kcal/Kg/d	52.86 ± 10.90	29.148 ± 8.783	12.10 ± 6.99
Protein intake g/kg/d	1.45 ± 0.29	1.043 ± 0.179	0.44 ± 0.25
Fat intake g/kg/d	2.19 ± 0.38	1.522 ± 0.544	0.49 ± 0.55
Carbohydrate intake g/kg/d	6.80 ± 2.40	2.793 ± 1.185	1.45 ± 0.41

Table 8. Univariate analysis of clinical and nutritional parameters in our 68 undernourished non-dialysis CKD patients.

Parameters		Undernutrition						
		No		Yes		OR	95% CI	P-value
		N	%	n	%			
Age range	≤45 years	20	57.11	11	39.4	0.49	0.18 - 1.28	0.14
	>45 years	15	42.9	20	30.5	1	Reference	
Gender	Female	20	57.1	12	36.4	0.43	0.16 - 1.13	0.08
	Male	15	42.9	21	63.6	1	Reference	
Provenance	Rural environment	6	17.1	9	27.3	1.81	0.57 - 5.81	0.31
	Urban environment	29	82.9	24	72.7	1	Reference	
Socio-economic status	Unfavorable	31	88.6	26	78.8	0.48	0.13 - 1.82	0.29
	Favorable	4	11.4	7	21.2	1	Reference	
HTA	No	8	22.9	4	12.1	0.47	0.13 - 1.72	0.25
	Yes	27	77.1	29	87.9	1	Reference	
Diabetes	No	32	91.4	24	72.7	0.25	0.06 - 1.02	0.05
	Yes	3	8.6	9	27.3	1	Reference	
CKD stage	Severe	9	25.7	1	3.0	0.09	0.01 - 0.77	0.03
	Terminal	26	74.3	32	97.0	1	Reference	
Caloric intake	Bottom	1	2.9	27	81.8	153	17.4 - 1348.7	<0.001
	Hypercalorie	34	97.1	6	18.2	1	Reference	
Fat intake	Bottom	1	2.9	27	81.8	153	17.4 - 1348.7	<0.001
	Hyperlipidic	34	97.1	6	18.2	1	Reference	
Carbohydrate intake	Bottom	1	2.9	14	42.4	25	3.05 - 205.61	0.003
	Hyperglucidic	34	97.1	19	57.6	1	Reference	

Table 9. Multivariate analysis of nutritional parameters in 68 CKD patients.

Nutritional parameters		Adjusted OR	95% CI	P-value
Caloric intake	Bottom	20.15	1.49 - 271.39	0.024
	Hypercaloric	1	Reference	
Fat intake	Bottom	20.15	1.49 - 271.39	0.024
	Hyperlipidemia	1	Reference	

Table 10. Distribution of undernourished and non-dialyzed CKD patients according to progression.

Evolution	Workforce	Percentage
Normal Nutrional Status	36	52.94
Improved nutritional status	20	29.41
Stationary Nutritional Status	7	10.29
Deaths	5	7.35
Total	68	100

4. Discussion

Out of a total of 140 chronic hemodialysis patients, almost half were undernourished, *i.e.* 48.57%. In this study, as elsewhere, the frequency of undernutrition in the population of chronic hemodialysis patients is a major concern for medical staff, given the high risk of morbidity and mortality. Safari *et al.* found a frequency of 56.04% of undernourished patients in a population of 298 patients [14]. Saile *et al.* found a frequency of 71.5% of patients with ECD [15]. The high incidence of malnutrition in this study can be explained by the patients' lack of good choices in terms of a proper and balanced diet. In the absence of a nutrition specialist, nephrologists take on the task of explaining the diet to patients, and more often than not this does not reflect patient realities or recommendations. The difference in these frequencies was linked to the size of the samples, which varied from one study to another, and to the fact that in our practice, patients are on a restrictive diet not recommended by a specialist dietician, but rather by the nephrologists, who do not take account of patients' nutritional realities.

The 45 - 55 age group was the most represented in this series (22.06%), with an average age of 45.29 ± 15.42 years; Adejumo *et al.* in Nigeria in 2016 found an average age of 48.80 ± 16.60 years [11]. Safari *et al.* found a mean age of 39 ± 6 years [14]; the high proportion of this age group could be explained by the fact that most African countries have a young population.

The high proportion of this young age group can be explained by the fact that it represents a period of life when protein-energy requirements remain high.

Males predominated, with a sex ratio of 1.19. El Ati *et al.* found male predominance with a sex ratio of 1.41 [16]. These results are contrary to those of Saille *et al.*, who found a predominance of females (52.38%) with a sex ratio of 0.91 [15].

The informal sector was the most affected socio-professional stratum, followed by housewives (45.59% and 32.35% respectively).

Patients with a favorable socio-economic standard of living accounted for only 16.18%, and more than half (83.82%) had an unfavorable socio-economic standard of living.

Noto-Kadou-Kaza *et al.* found that 52.8% of patients had a low socio-economic standard of living [17]. Renal diseases represent a heavy economic burden; the cost of treatment was estimated at around 10,000 - 20,000 USD/year/person for renal transplantation and 50,000 - 90,000 USD/year/person for hemodialysis [18].

Hypertension and diabetes were the most common antecedents, accounting for 82.35% and 17.65% respectively. Hypertension and diabetes are the two main risk factors for chronic kidney disease worldwide. More than 4/5 patients had vascular nephropathy; arterial hypertension was the main cause and represents a real public health problem, not only because of the high cost of its management, but also because of the high incidence of morbidity and mortality. Asad Ali et al reported that arterial hypertension was one of the factors associated with accelerated GFR decline [19].

SGA is based on a combination of subjective and objective elements of the patient's medical history. The degree of undernutrition is assessed on the basis of estimated intakes, physical activity levels and body composition by evaluating muscle mass and subcutaneous fat, as well as weight variations over the last 6 months [20]

According to SGA, patients were divided into class A 51.47%; class B or moderate undernutrition was 33.82% and class C or severe undernutrition 14.71%; Kalantar-Zadeh *et al.* had found a significant correlation between SGA score, morbidity and mortality in hemodialysis patients [21].

In this study, more than half the patients (55.88%) had a BMI below 18. According to some data in the literature, a BMI < 20 kg/m^2 is consistently associated with an increased risk of mortality. Cardiovascular prognosis is well correlated with BMI level: any decrease of one unit in BMI is accompanied by a 6% increase in the risk of cardiovascular mortality [22].

In this study, over 9/10 of patients were not physically active. Studies of physical activity in CKD patients reveal a high level of sedentariness, and find that sedentariness is associated with excess mortality; on the other hand, physical activity reduces morbidity and mortality [23].

In this study, mean energy intake was 2465.84 ± 1299.52 kcal/d; Protein 73.97 ± 30.58 g/l; Fat 108.12 ± 50.63 g/l; Carbohydrate 306.75 ± 203.30 g/l. Safari *et al.* found in their study that patients' mean daily energy intake was 1240 ± 420 kcal/d. The mean daily protein intake was 0.73 ± 0.3 g/kg/d [14]. Eighty percent of patients had protein intakes below 1 g/kg/d. Saile *et al.* had found hypoprotidemia ≤ 60 g/L in 27% of cases, albuminemia < 38 g/l in 58% of cases; pre-albumin < 300 mg/l in 75% of patients; total cholesterol < 1.5 g/l [15].

El Ati1 *et al.* found a decrease in albumin (36.97 ± 1.57 vs. 39.38) and cholesterol (3.38 ± 0.3 vs. 3.81 ± 0.15), but without significant differences [24].

Hypoalbuminemia is a marker strongly associated with undernutrition and poor outcomes in patients with chronic kidney disease, but it is also a marker of inflammation; it does not always reflect recent nutritional intake. Elevated CRP may explain hypoalbuminemia unrelated to nutritional deficiency. The combined interpretation of albuminemia + CRP is much more relevant than each marker alone [13]-[15].

The breakdown of food intake in this study showed in descriptive analysis that

Class C patients had a much lower average daily calorie intake than Class B and A patients.

There is a significant correlation between the SGA score and morbidity and mortality in hemodialysis patients [3].

The study found a statistically significant association in univariate and multivariate analysis between undernutrition and cholesterol, caloric intake, carbohydrates and lipids, with a P value of less than 0.024.

Advanced uremia is characterized by persistent digestive disturbances such as nausea, vomiting, altered taste and loss of appetite, leading to reduced food intake. This leads to insufficient protein-energy intake, favoring malnutrition.

The high frequency of hospitalization and morbidity and mortality associated with undernutrition has been described in the literature [25]. Mortality among undernourished patients in this study was 10.29%. COMBE *et al.* in 2011 reported 20% of deaths in their study. The lack of early detection and management of undernutrition could be a factor in morbidity and mortality [26].

5. Conclusion

This study shows that the frequency and mortality of malnourished patients remains high and constitutes a real medical problem; early detection and planning of better management through collaboration between the dialysis center and specialized nutrition centers could help reduce this frequency.

Therapeutic education for patients suffering from chronic renal failure is an integral part of their care, and should be carried out by a specialist nutritionist. Dietary information sheets should be drawn up, taking account of dietary realities, and given to each patient suffering from end-stage chronic renal failure.

Recommendations

Demand for early assessment and treatment of undernutrition in patients with chronic kidney disease.

Create a nutrition unit within the Nephrology and Hemodialysis Department to prevent and effectively manage undernutrition in these patients.

Make health insurance possible for these patients to reduce the cost of their care and facilitate clinical research on these patients.

Declaration of Informed Consent

All authors appearing in this article share and accept equally the publication of this article in your journal.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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Abbreviation

DPE: Protein-Energy Denutrition
GFR: Glomerular Filtration Rate
HTA: Hypertension
SGA: Subjective Global Assessment
BMI: Body Mass Index
CKD: Chronic Renal Failure
Kcal: Kilocalorie
g/l: Gramme per liter
g/kg/d: Grams per kilogram per liter
Coll: collaborators