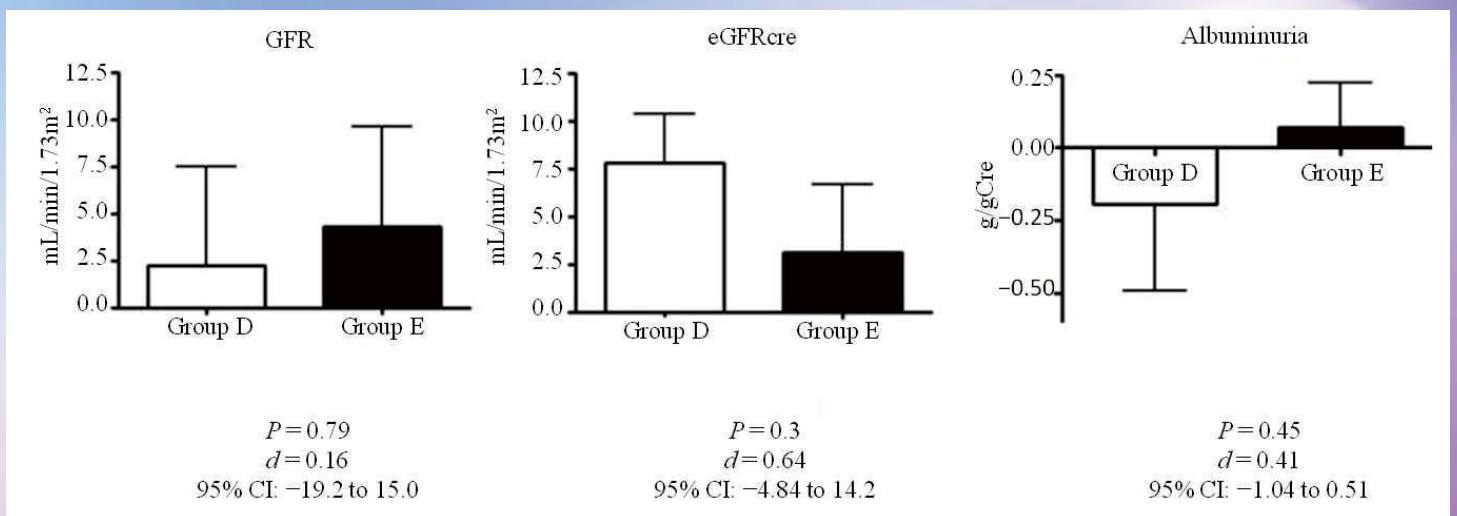


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Epidemiological Profile of Chronic Hemodialysis Patients in Ouagadougou

Coulibaly Gérard*, Da Sami Augustin, Karambiri Adama Roger, Lengani M. H. Aïda, Sanou Gaoussou, K. Manan Hien, Lengani Adama

Department of Nephrology and Hemodialysis, University Hospital Center Yalgado Ouedraogo (UHC-YO), Ouagadougou, Burkina Faso

Email: coulibalygerard@hotmail.fr

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Abstract

Goal: By describing the epidemiology of chronic hemodialysis patients in the single hemodialysis unit of Burkina Faso, we want to contribute to the prevention and improvement of chronic renal failure management (CRF) in this country. **Patients and Methods:** A descriptive cross-sectional study was conducted in the hemodialysis unit of the University Hospital Center Yalgado Ouedraogo (UHC-YO) during the period from February 12 to May 15, 2015. The patients who started hemodialysis in this unit and were treated for at least three months were included in this study. The sociodemographic and clinical data were collected. The statistical significance was defined for a probability ($p \leq 0.05$). **Results:** One hundred and seventy-two patients (71.2% of the 240 patients of the unit) have been included. The sex ratio was 1.6. The average age was 45.2 ± 12.4 years old. The presumed causes of CRF have been identified in 134 cases (77.9%). The most frequent were hypertensive nephropathy (65 cases; 48.5%), chronic glomerulonephritis (41 cases; 30.6%; including 11 viral origin and 16 with history of recurrent otorhinolaryngologic infections and/or urinary schistosomiasis). Hemodialysis began in an emergency context in 118 cases (68.6%). The average duration of hemodialysis was 29.4 ± 28.4 months. **Conclusion:** The main suspected causes of CRF were hypertension and chronic glomerulonephritis. The origin of the latter seemed more often infectious. Prevention of CRF in Burkina Faso should be focused on that of hypertension and infectious diseases.

Keywords

Burkina Faso, Chronic Renal Failure, Epidemiology, Hemodialysis, Yalgado Ouédraogo

1. Introduction

The renal replacement therapy is essential for patient survival at the final stage of chronic renal failure (CRF).

*Corresponding author.

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Several modalities of this type of treatment exist: renal replacement therapy (hemodialysis or peritoneal dialysis) and kidney transplantation. Hemodialysis is the most commonly used modality in the world [1] [2].

The treatment of end-stage renal disease (ESRD) is expensive, especially in case of hemodialysis [3]. The accessibility to this modality is far better in developed countries than developing countries. In Africa, there is a disparity in accessibility through the reported prevalences. Thus, it was reported in 2015 a prevalence of 400 pmh in North Africa and 12.6 pmh in West Africa [4].

The profile of chronic hemodialysis patients varies from one region of the world to another. This variation is often a reflection of the quality of the comprehensive health care level in each region. Knowing the profile of hemodialysis patients would certainly help in the definition of the areas of prevention of the chronic kidney disease (CKD). If this is effective in developed countries, this is not the case in developing countries where data are still embryonic [4]. Descriptive studies seem so indispensable in this part of the world.

In this study, we wanted to describe the epidemiological profile of chronic hemodialysis patients in the hemodialysis unit of the University Hospital Center Yalgado Ouedraogo (UHC-YO) of Ouagadougou. The goal is to contribute to the prevention and improvement of the CKD management in Burkina Faso.

2. Patients and Method

It was a descriptive cross-sectional study from February 12 to May 15, 2015. It was conducted in the hemodialysis unit of the UHC-YO. The latter opened its doors in December 2000. Its initial capacity of nine posts is extended to 29 (divided over two sites within the UHC-YO) starting in 2009. The frequency of hemodialysis sessions at the time of the study was one every five days. It is therefore a serious situation of under-dialysis responsible among others of a high frequency of ascites of great abundance (Figure 1).

The hemodialysis unit with that of the clinical nephrology constituted the department of Nephrology and Hemodialysis of the UHC-YO, the only one of the country at the time of the study. In this second unit, hospitalization of patients and nephrology outpatient consultations were carried out. The medical staff of the department consisted of three nephrologists (including a volunteer of Cuban nationality), a doctor in the last year of specialization in Nephrology, and two general practitioners. The hemodialysis nurses were 23 including two senior health officers in surgery.

The cost of the hemodialysis session was funded by the State. On the other hand; drugs, tests and transportation



Figure 1. Hemodialysis patient with an abundance of ascites reflecting the sub-dialysis. An ascites puncture is underway. Ascites is fed back into the arterial line during the hemodialysis session, according to the technique of the previous [5] we have adapted by lack of isolated pump for ascites.

expenses were entirely charged to nearly all hemodialysis patients. There was not yet a generalized health insurance system.

Our study included patients undergoing hemodialysis in the hemodialysis unit of the UHC-YO of Ouagadougou. At the beginning of the data collection period, 240 patients were treated by iterative hemodialysis in the unit. We included in the study 172 patients (71.2%) according to the following criteria:

- having started hemodialysis in the hemodialysis unit of the UHC-YO;
- and having been treated for at least three months.

We operationally defined some concepts:

- chronic hemodialysis patient was a patient treated by iterative hemodialysis for at least three months for ESRD;

- In the absence of anatomopathological data, the diagnostic criteria for the presumed causes of ESRD relied on clinical, biological and radiological set of evidence of the period before the hemodialysis setting. We thus considered:

✓ Chronic glomerulonephritis (CGN): proteinuria greater than 1 g/24 h, with or without hematuria, with or without CRF, with or without small harmonious bilateral kidneys on ultrasound. We included diabetic nephropathy and nephropathy related to HIV;

✓ Chronic tubulointerstitial nephritis (CTIN): history of recurrent urinary tract infections, gout, orurolithiasis associated with chronic leukocyturia with or without CRF, long term hydronephrosis, or asymmetric kidneys or with irregular borders on ultrasound;

✓ Hypertensive nephropathy: long term hypertension (HTN) with left ventricular hypertrophy on electrocardiogram and hypertensive retinopathy associated to CRF with or without proteinuria ≥ 0.5 g/24 hours;

✓ Polycystic kidney disease (presumed autosomal dominant) according to the modified Ravine's criteria of Pei: three unilateral or bilateral cysts in people over 15-year-old, three cysts by kidney between 40 and 59 years, at least four cysts by kidney after 59 years [6].

The nephropathy was considered unclassifiable when data were insufficient to allow the classification.

The source of data consisted of patient medical records and the individual monitoring notebooks of hemodialysis sessions. We collected sociodemographic data (gender, age, origin, and professional category) personal medical history, data on the vascular approaches for hemodialysis in patients, and duration and mode of entry into hemodialysis.

The data were recorded and analyzed using SPSS software version 17. For the comparison of qualitative variables, we used Chi square and exact Fischer tests. The Student's t test was used for comparison of quantitative variables. The level of statistical significance was set for a probability $p \leq 0.05$.

This study had a goal of defining the epidemiological profile. It required a clinical examination and a collection of data from patients. The informed consent of patients was required prior to the collection of these data. These have been treated confidentially. The UHC-YO lacked an ethics committee at the time of the study.

3. Results

3.1. Sociodemographic Data

At the time of the study, the population of Burkina Faso was estimated at 18,450,494 people and that of Ouagadougou at 2,500,000. Were included in this study, 172 hemodialysis patients representing 71.2% of the 240 patients of the unit at the beginning of the study, 9.3 per million population (pmp) in Burkina Faso and 68.8 pmp in the city of Ouagadougou. They were divided into 66 women (38.4%) and 106 men (61.6%), with a sex ratio of 1.6.

The average age of patients was 45.2 ± 12.4 years old (extremes = 16 and 78). The average age of men was 41 ± 14.1 years and that of women was 45.3 ± 14.2 years old (extremes = 16 and 73). There was no significant difference in age between men and women ($p = 0.49$). The overall modal age group was that of 50 to 59 years (**Table 1**).

The most common level of education was high school (**Table 2**).

In total 80 patients (45.6%) were unemployed, farmers or retired.

The patients came from 11 of the 13 regions of the country. The three most frequent regions of origin were: the Centre (107 patients, 62.2%), the Hauts-Bassins (15 patients, 8.7%) and the Centre-Est (12 patients, 7%). No patient was from the Sud-Ouest or Plateau-Central (**Figure 2**).

Table 1. Distribution of hemodialysis patients by age and gender.

	Male n (%)	Female n (%)	Total n (%)
<20 years	4 (3.8)	3 (4.6)	7 (4.1)
20 - 29 years	20 (18.9)	10 (15.2)	30 (17.4)
30 - 39 years	26 (24.5)	9 (13.6)	35 (20.3)
40 - 49 years	20 (18.9)	16 (24.2)	36 (20.9)
50 - 59 years	23 (21.7)	15 (22.7)	38 (22.1)
≥60 years	13 (12.2)	13 (19.7)	26 (15.2)
Total	106 (100)	66 (100)	172 (100)

Table 2. Level of education and profession of hemodialysis patients.

	Number	Percentage
Level of education		
Elementary school	38	22.1
Middle and High school	61	35.5
College and university	31	18.0
None	42	24.4
Professional status		
Government official	32	18.6
Private company employee	17	9.9
Trader	43	25.0
Farmer	14	8.1
Unemployed	52	30.2
Retired	14	8.1

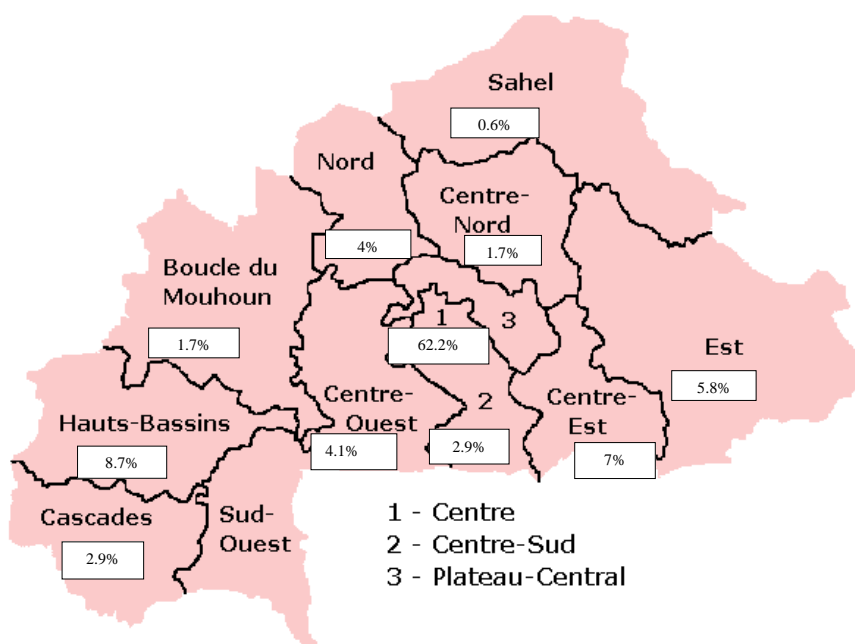


Figure 2. Relative frequency of origin regions of hemodialysis patients in Burkina Faso.

3.2. Personal Medical History of Patients

The patients had a history of known hypertension in 117 cases (68%), chronic renal failure in 108 cases (62.8%), and diabetes in 14 cases (8.1%). The 108 patients with CRF had a nephrology follow-up before hemodialysis for a period of 1 to 205 months (17 years); therefore at least 64 patients (37.2%) had their first contact with the department at the final stage of CRF.

History of macroscopic hematuria was noted in 38 cases (22.1%). As infections, we noted: otorhinolaryngologic sphere infections (ORL; 54 cases or 31.4%), urinary tract infections (53 cases, 30.8%), urinary schistosomiasis (34 cases, 19.8%), six cases (3.5%) of HIV infection and five cases (2.9%) of viral hepatitis B. Nineteen patients or 11% had a history of gout. A concept of frequent use of traditional medicines was found in 82 cases (47.7%).

3.3. Presumed Cause of ESRD

The presumed causes couldn't be identified in 38 cases (22.1%). The 134 remaining cases (77.9%) were:

- hypertensive nephropathy: 65 cases representing 48.5% of the 134;
- chronic glomerulonephritis: 41 cases (30.6%) divided into 14 cases related to diabetes representing 34.1% of the 41 patients and 8.1% of the 172 patients, 11 cases of viral origin (26.8%) and 16 cases for which the cause has not been identified although they all had a history of recurrent otorhinolaryngologic infections and/or urinary schistosomiasis;
- chronic tubulointerstitial nephropathy: 26 cases (19.4%);
- polycystic kidney disease: two cases (1.5%).

3.4. The Beginning Circumstances of Hemodialysis

The hemodialysis started in an emergency context in 118 cases (68.6%). The 54 remaining cases (31.4%) were planned hemodialysis.

One hundred sixty-two patients representing 94.2% of the cases started the hemodialysis with a central venous catheter (CVC). Among the 10 others (5.8%), the first hemodialysis session was done with an arteriovenous fistula.

3.5. Vascular Access Situations of Patients

At the time of the study, 164 patients (95.3%) had a CVC at least one time. The average number of CVCs received per patient was 3.5 ± 2.2 (extremes = 1 and 20). This number was:

- between 1 and 3: 106 patients (64.6%);
- between 4 and 5: 34 (20.7%);
- between 6 and 10: 19 (11.6%);
- greater than 10: 5 (3.1%).

An arteriovenous fistula was created at least once in 157 patients (92.3%). We observed a primary dysfunction of the first fistula in 38 cases over the 157 cases (24.2%). The average number of fistulas created per patient was 1.4 ± 0.7 (extremes = 1 and 5).

3.6. Duration in Hemodialysis

At the time of the study, the average duration of hemodialysis patients was 29.4 ± 28.4 months (extremes = 3 and 162). This duration was distributed as follows:

- ≤ 12 months: 55 patients (32%);
- 13 to 48 months: 81 patients (47.1%);
- ≥ 49 months: 46 patients (26.7%).

4. Discussion

The recommended frequency of hemodialysis sessions is three per week. At the time of our study, with 29 posts for hemodialysis, the hemodialysis unit of the UHC-YO couldn't ensure such a program; regardless of the insufficiency of human and financial resources. The solution would be to increase the number of generators in the

city of Ouagadougou and open a unit for example in the West of the country. This solution involves at least the availability of human resources in sufficient number; which is not yet the case. The insufficiency of hemodialysis center coverages is a general problem in Africa, especially in the Sub-Saharan part [4].

The national prevalence of treated ESRD is low, compared to those of 154 and 370 pmp respectively in France and the United States [7]. In reality the result that we report is underestimated because all patients of the interior part of the country with ESRD cannot reach the department of Nephrology and Hemodialysis of the UHC-YO. In addition, a significant number of patients admitted to this department for ESRD have no access to hemodialysis for various reasons including the lack of financial resources. The patients were men in 61.6%. Our results are comparable to other African studies that report a frequency of male of at least 60% [8] [9]. Patients in our study were young (45.2 ± 12.4 years), like those of other African countries where the average age varies between 43 and 50 years [10] [11]. It is an economically productive group of the population which activity is forcefully reduced due to the sub-optimal treatment conditions. In contrast, in developed countries, the average age of patients is usually greater than 60 years [7]. Nearly half of the patients in our study had no employment, were farmers or retired. In a context where the costs of drugs and tests are entirely charged to the patient, this can be a problem for a good adherence to treatment and follow-up of these patients. The high cost of drugs was pointed out by Seck *et al.* in Senegal as a factor favoring the non-compliance to treatment in patients with chronic kidney disease [12]. However, the solidarity of the community of origin of these patients is not without limit; when this runs out, the patient is let in a state of extreme poverty. Developing countries engaging in a chronic hemodialysis program should fund enough care in order to provide patients with better productivity conditions.

We could not identify the presumed nephropathy in 22.1% of cases. This is not surprising because on one hand, more than a third of patients reach the department only at the final stage of CRF, and on the other hand, the diagnostic tests were limited.

Among the presumed causes of ESRD, hypertension and CGNs were the most frequent in our study. These are usually the first cause of CRF in Africa [9] [10] [13]. In our context where patients arrive at a late stage, the role of hypertension in renal dysfunction may be difficult to establish. The risk is to overestimate its frequency among the causes of renal dysfunction. In all cases, its good control is a major objective to achieve not only for the protection of the kidneys before the final stage of CRF, but also for the secondary prevention of cardiovascular complications in hemodialysis patients. This goal is however difficult to achieve in our hemodialysis unit due to the limitation of resources for the unit and patients.

The CGNs came in second place as a cause of CRF in our patients. It is a common cause in the sub-Saharan Africa countries. Thus, in Africa countries such as Nigeria and Sudan where it is the second cause after hypertension, its frequency is 27.8% and 17.6%, respectively [9] [14]. In Ghana, CGNs remain the first cause of CRF with a frequency of 33% reported in a hospital study [15]. The causes of these CGNs in our study seem to be mainly infectious if we consider the high frequency of history of ORL sphere infections and the results of the study of Lengani *et al.* in the same hospital [16]. This study of Lengani *et al.* led to identify infections as a first cause of CRF with a frequency of 42.5%. The prevalence of nephropathy related to HIV as a cause of ESRD is growing in sub-Saharan Africa [17].

Diabetes in our study was a less common cause of ESRD. However, its place among the causes of ESRD seems growing in Burkina Faso. Indeed, the study of Lengani *et al.* in 1997 noted only two cases of diabetes among 174 patients with severe CRF [16]. This disease, which prevalence is growing worldwide, is the first cause of ESRD in developed countries [18], and the second in more and more sub-Saharan Africa countries [10] [19] [20]. In this part of Africa, the prevalence among hemodialysis patients varies from one region to another. Thus, it goes from 6.1% in Ethiopia to 23.8% in Zambia [2]. Diabetes and hypertension are diseases with an increasing prevalence in the general population, which is favored among other by a modern lifestyle characterized by sedentary lifestyle and a diet too often salted or sweet. They are modifiable factors which taken into consideration would contribute to the reduction of the prevalence of CRF.

The majority of our patients (94.2%) started their first session of dialysis with a central venous catheter. This rate is very high and explains on one hand various difficulties to create arteriovenous fistula in advance for patients followed up before the final stage and on the other hand the delayed first contact of patients with the department of Nephrology and Hemodialysis. Sanogo in Bamako found a comparable rate of 97.4% and encounters the same difficulties in the management of his patients [21]. Even in developed countries, patients are treated late and have to begin the hemodialysis with a CVC. In France in 2011, 33% of patients started their di-

alysis session in an emergency situation and 56% with a CVC [22].

The average number of CVCs per patient was particularly high. This is due to a delay in patients treatment, a long waiting time (94.5 days in 2011, 72.3 in 2014 [23] [24]), and a lack of equipment for the repair of fistula [24]. The long waiting time is in part due to a deficiency in human resources, the limited availability of the operating room for the creation of fistulas at the UHC-YO and difficulties related to patients to pay the fees for the creation of the fistula.

Limitations of the Study

Most of the data were gathered from patient medical records. The quality and quantity of the information contained therein depend on the writer who could be an intern or a doctor (general practitioner or nephrologist). It can be noted the absence of some paraclinical data (including anatomopathological) related mainly to the lack of equipment or economic difficulties at the level of the patients. These limitations have not prevented us from describing the UHC-YO hemodialysis unit patients and drawing interesting information.

5. Conclusion

Our study reported the difficult conditions of treatment in the unique hemodialysis unit located in Ouagadougou, the capital of Burkina Faso. The patients are mostly young. The most frequently encountered causes of chronic kidney disease are hypertension and chronic glomerular nephropathy. The latest seems to be more often related to bacterial or viral infections than diabetes. The treatment of end-stage renal disease needs to be sufficiently funded to meet the standards; this could be achieved by innovative modes of financing. Its prevention should focus on hypertension, and infectious diseases in the general population of Burkina Faso.

Conflict of Interest

None.

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Quality of Life of Patients on Peritoneal Dialysis in Dakar: A Senegalese Single Centre Experience

Kane Yaya^{1*}, Cisse Mouhamadou Moustapha², Seck Sidy Mohamed³,
Lemrabott Ahmed Tall², Faye Maria², Hounsounou Christian¹, Diallo Kalilou¹,
Ka El Hadji Fary², Niang Abdou², Diouf Boucar²

¹Nephrology and Internal Medicine Department of Assane Seck University, Ziguinchor, Senegal

²Nephrology Department of Teaching Hospital Aristide Le Dantec, Dakar, Senegal

³Nephrology Department of Gaston Berger University, Saint-Louis, Senegal

Email: ^{*}yayuskanus@yahoo.fr

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Abstract

Introduction: Measuring the quality of life (QOL) in recent years has become an indispensable tool in monitoring patients suffering from chronic diseases. We conducted this study to assess QOL of patients undergoing peritoneal dialysis in Dakar, and to identify associated factors. **Patients and Methods:** This is a cross-sectional study which was carried out from 10 to 30 June, 2011 in the peritoneal dialysis unit at university hospital in Dakar. We included all patients with end-stage renal disease (ESRD) of any age, who were on PD since at least six months and who gave their consent. The QOL was assessed using the Kidney Disease Quality of Life Short-Form 1.2 (KDQoL-SF). **Results:** Sixteen patients were included with a mean age of 50.25 ± 13.48 years and a sex-ratio of 1.27. Considering SF-36, the overall mean score (SMG) was 60.11 ± 15.96 with a Mean Physical Component Summary Scale of 53.66 ± 16.98 and a Mental Component Summary Scale of 70.85 ± 6.14 . Concerning the KDQoL-SF, the global mean score was 61.83 ± 19.35 with a mean physical score of 50.55 ± 16.52 and a mean mental score of 62.52 ± 21.53 . The mean dialysis specific dimension score was 62.52 ± 21.53 and the mean mental health score was 85.93 ± 12.06 . Age, weight, level of instruction and social support were correlated with a worse QOL. **Conclusion:** This study showed an alteration of our PD patients' QOL, particularly in their physical health. However, the number of patients included in the study is not enough to permit a formal conclusion.

Keywords

Quality of Life, Peritoneal Dialysis, Dakar

*Corresponding author.

1. Introduction

The quality of life (QOL) is undeniably a broad concept, especially when it is related to health and chronic disease but it has not yet been the subject of a public health plan. This measure is supposed to quantify the impact of diseases or medical interventions on the lives of patients in the subjective point of view [1] [2]. In Senegal, prevalence of chronic kidney disease is estimated to 4.9% and among these 0.2% require treatment by dialysis [3]. Peritoneal dialysis (PD) program started in Senegal since 2004 and contributed to treating more and more patients [4]. This study was conducted to evaluate the QOL of PD patients in Dakar and to identify the associated factors.

2. Patients and Methods

We conducted a descriptive cross-sectional study from June 10th to 30th, 2011 in the peritoneal dialysis unit of University Hospital Aristide Le Dantec in Dakar. We included all patients with end-stage renal disease (ESRD) of any age, who were on PD since at least six months and who gave their consent. Patients with recent complications less than one month before and irregularly followed patients were excluded from the survey. QOL of the study population was assessed with the SF-36 [5] and the KDQoL-SF 1.2 [6] questionnaires. The short form 36, the generic module, includes 35 items corresponding to 8 fields divided into two dimensions:

- The physical dimension on “general health”, “physical activity”, “limitations due to physical activity”, “physical pain”, and “vitality”.
- The mental health dimension on “limitations due to mental activity”, “life and relations with others”, and “mental health”.

The KDQoL specific questionnaire tailored to kidney disease included 143 items divided into the following 19 areas:

- General health: D1
- Physical Activity: D2
- Limitations due to the physical condition: D3
- Physical pain: D4
- Vitality: D5
- Friendly and family relationships: D6
- Professional status: D7
- Limitations due to the mental state: D8
- Life and relationships with others: D9
- Mental health: D10
- Quality of the environment: D11
- The burden of kidney disease: D12
- Cognitive functions: D13
- Symptoms and problems: D14
- Effects of the disease on daily life: D15
- The quality of sexual activity: D16
- Sleep: D17
- Patient satisfaction: D18
- Encouragement by the dialysis team: D19

These areas are divided into four dimensions:

- Physical dimension on the “physical function”, “professional status”, “limitations related to physical state”, “pain”, “general health” and “energy”.
- Mental health dimension on the “welfare”, “quality of social life”, “burden of disease”, “social support”, and “limitations related to psychological health”.
- Dialysis specific dimension related to “cognitive function”, “absence/presence of symptoms”, “disability of dialysis on daily life”, “sexual function” and “sleep”.
- A dimension related to patient satisfaction on how it should be dealt with a question about “general satisfaction” and another about “support of the health care team”.

Scoring responses on a scale of 0 to 100 where 0 is the worst quality of life and 100 the best. A score is calculated for each domain (SMD). This is the maximum *N* score ratio an individual may have in the area and the

patient's *n* score in the field. It is expressed as a percentage and can identify the most affected areas. In addition, overall average score (SMG) corresponding to the mean SMD can assess each dimension. A better quality of life with a SMG high score has been noted. We opted firstly, seeking better interpretation of our results, for a standardized 50 with a standard deviation of 10.

The living standard was evaluated using patients' monthly expenses. In all patients, the Charlson score was calculated [4] [7], as well as the number of peritonitis. Statistical analyzes were performed using SPSS 11.5 for Windows. Continuous variables were presented as mean \pm standard deviation and categorical variables as percentage. Comparison of proportions and means were done using Pearson's Chi-square test or Student's t-test as appropriated. Multivariate regression analysis was used to identify clinical and biological parameters associated with bad QOL. All statistical tests were considered significant if $p < 0.05$.

3. Results

In a total of 20 patients meeting the inclusion criteria but four patients were excluded for refusal. Thus, 16 patients participated in this study (acceptance rate of 80%). The characteristics of the study population are shown in **Table 1**.

On the SF-36, the SMG was 60.11 ± 15.96 . The score of physical health dimension is 53.66 ± 16.98 and that of the mental health dimension, 70.85 ± 6.14 . SF-36 average scores (SMD) are shown in **Figure 1**.

For KDQoL, the SMG was 61.83 ± 19.35 . The mean scores for each dimension were:

- Physical dimension: 50.55 ± 16.52 22
- Mental health dimension: 66.52 ± 14.14 23
- Dialysis specific dimension: 62.52 ± 21.53 24
- The dimension on patient satisfaction: 85.93 ± 12.06 25

The different SMD for KDQoL are shown in **Figure 2**.

Alteration of the quality of life was statistically significantly correlated with age in the D18 field ($p = 0.01$), with the weight in the D1 domains ($p = 0.01$), D2 ($p = 0.03$), D3 ($p = 0.02$) and D18 ($p = 0.02$), the level of education in the D3 ($p = 0.04$) and social support in the D2 areas ($p = 0.01$), D6 ($p = 0.04$), D7 ($p = 0.01$) and D15 ($p = 0.01$).

Table 1. Demographical and clinical characteristics of patients.

Variables	N (Percent)	Mean (SD)
Age (years)		50.25 ± 13.48
Sex-ratio (M/F)	1.27	
Level of formal education		
Primary	03 (18.75%)	
Secondary	05 (31.25%)	
University	03 (18.75%)	
Illiterate	05 (31.25%)	
Married	13 (81.25%)	
Profession	03 (18.75%)	
Without profession	11 (68.75%)	
Retired	02 (12.5%)	
Autonomous	15 (93.75%)	
Social support	12 (75%)	
Awareness of the disease	15 (100%)	
Charlson score		$03 \pm$
Weight (kg)		$64.34 \pm$
APD	01 (06.2%)	
CAPD	15 (93.8%)	
Peritonitis	03 episodes	

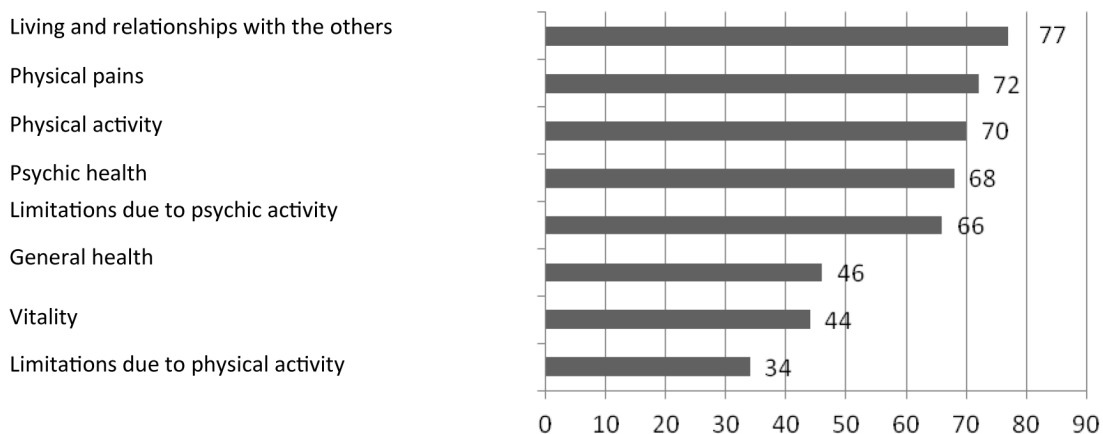


Figure 1. Summary Basis of Decisions (SBD) using SF-36.

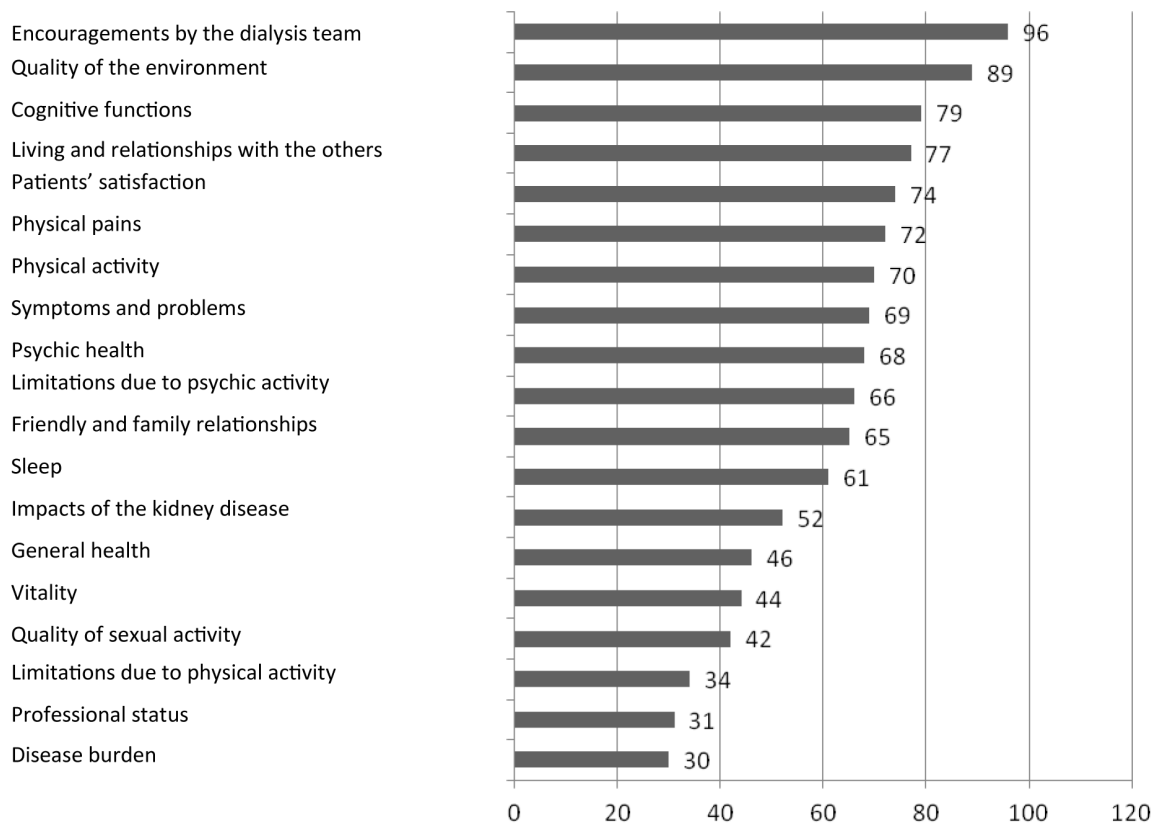


Figure 2. Different SBDs of the KDQOL.

4. Discussion

This is the first study which was conducted in Senegal where the quality of life of PD patients was assessed. The KDQoL was chosen because of its dialysis specific dimension [8] [9]. Some epidemiological and clinical variables had negative influences on our patients' QOL. Thus, age was correlated with alteration of QOL in the field of patient satisfaction. In a study involving patients with regular hemodialysis, there was a correlation in the areas of pain, quality of the environment, cognitive functions [10]. The weight was correlated with alteration of QOL in the fields of general health, physical activity, vitality and patient satisfaction. This is explained by the fact that significant water/salt overloads had a negative impact on cardiorespiratory performance. The low level

of education was correlated with impaired QOL in the field of “limitations due to physical activity”. This corroborates the results obtained by the same team on a hemodialysis population [10]. Social support was correlated with impaired QOL in the areas of physical activity, professional status and limitations due to mental activity. Similar results were found in hemodialysis [10]. This impairment of quality of life through social media can be explained by a feeling of guilt of patients, but especially by the fact that non-autonomous patients needed this support more.

About the SF-36, our results are consistent with the Figure 1 and Figure 2. We noted a slight similarity in the “General Health” and “Mental Health” areas. By contrast, it can be noted in our series that the “Limitations due to physical activity” and “Vitality” areas are altered in comparison with the studies of other authors (Figure 3). The results in the SF-36 in our study are far better than those obtained in hemodialysis [10] as shown in Figure 4 in connection with probably the best treatment and greater autonomy that the PD can offer.

Regarding KDQoL-SF average scores (SMD), the results of field limitations due to physical activity, quality of sexual activity, relationship and life and patient satisfaction showed a similarity with Boini in France [1] [2]. The results on the areas the sleep, friendly relations, physical activity, physical pain and burden of kidney disease corroborate those of Korea [11] (Figure 4). As for the average scores per dimension, it is noted that only the physical dimension is widely impaired. Indeed, our results in the mental health dimension were best compared to those of Turkey and Korea [11]-[13].

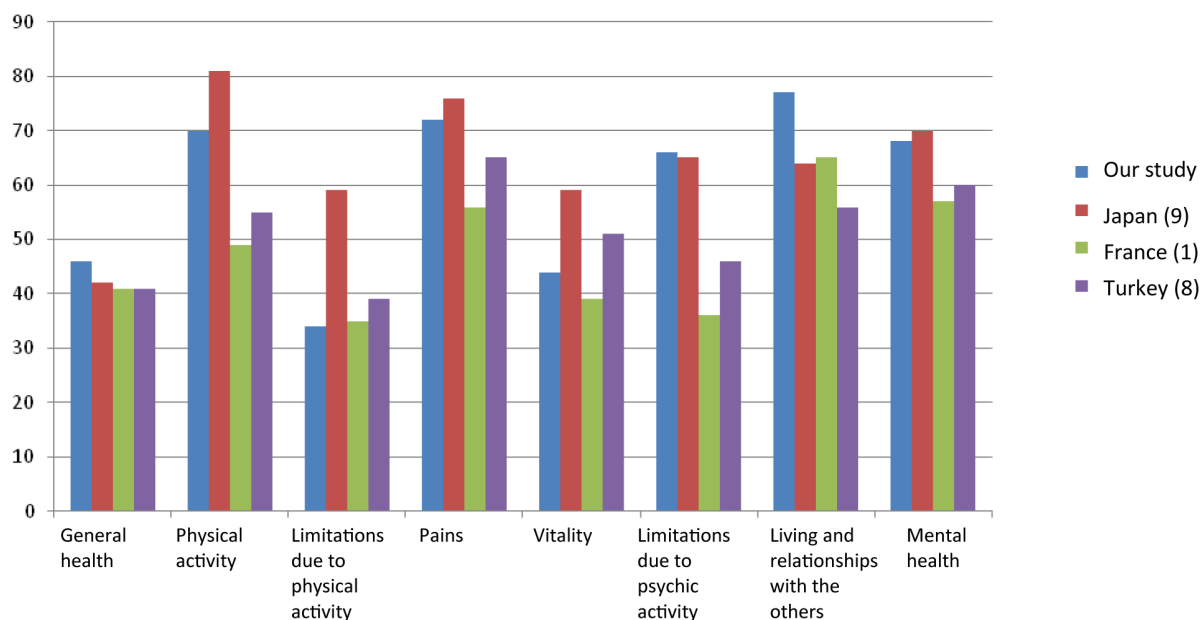


Figure 3. Histogram comparing quality of life as per SF-36.

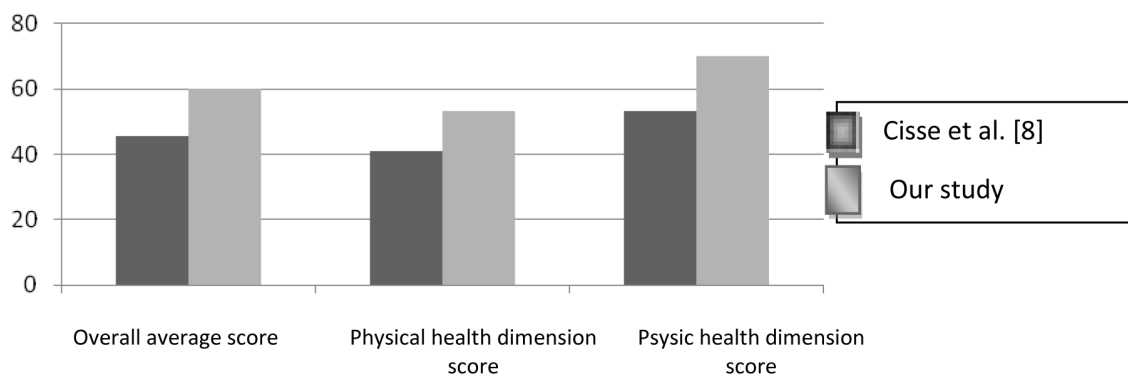


Figure 4. Histogram comparing SF-36 results.

Limitations of the Study

The main limitation was in the translation and cross-cultural adaptation of the questionnaire. A simple translation in the national language (Wolof) is not enough and a very precise work is needed, particularly as far as exploring the concepts is concerned. You can either create new questionnaires or adapt Anglo-Saxon questionnaires. The size of the sample which is not very representative does not allow for a correct interpretation of the results.

5. Conclusion

The study shows a poor QOL in PD patients assessed with both SF-36 and KDQoL-SF tools. Physical health was the most impaired item. The main associated factors with QOL were age, weight, social and education level. Given the small sample, a study of a larger scale is necessary in order to better analyze the factors affecting the quality of life.

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Both Diet and Exercise Are Necessary for Obese CKD Patients: A Pilot Prospective Randomized Controlled Study

Kazuyuki Noguchi¹, Hirayasu Kai¹, Hirofumi Zempo², Fumio Mizuno², Masahiro Hagiwara¹, Naoki Morito¹, Joichi Usui¹, Chie Saito¹, Shinya Kuno², Kunihiro Yamagata^{1*}

¹Department of Nephrology, Faculty of Medicine, University of Tsukuba, Tsukuba, Ibaraki, Japan

²Graduate School of Comprehensive Human Sciences, University of Tsukuba, Tsukuba, Ibaraki, Japan

Email: k-yamaga@md.tsukuba.ac.jp

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Abstract

Aim: This study aimed to examine the effects of exercise training on kidney function and nutrition status in obese Chronic Kidney Disease (CKD) patients. **Methods:** This is a prospective randomized controlled trial. Twelve adult obese CKD patients were randomly assigned to dietary instruction alone group (Group-D) or to both dietary instruction and exercise training group (Group-E). All patients received supervised dietary advice including calorie, protein, and salt intake for a period of 12 weeks. In addition, patients in Group-E underwent a fitness-training program. A change in glomerular filtration rate (GFR) was the main outcome. Secondary outcomes were changes in body mass index, serum creatinine-based estimated-GFR, serum albumin, and albuminuria. **Results:** Changes in GFR and all secondary outcomes were not statistically significant in either of the two groups. Although exercise training did not appear to significantly affect serum albumin levels in either group, it did present with a large sized effect. **Conclusion:** Exercise training might not have any effect on kidney function; however, the combination of exercise training along with dietary advice may prove to be more effective in maintaining the nutrition status when compared with dietary instructions alone in obese CKD patients. These results suggest that appropriate exercise training with dietary instructions is recommended for the treatment of obese CKD patients.

Keywords

CKD, Obesity, GFR, Diet, Exercise Training

*Corresponding author.

1. Introduction

Chronic kidney disease (CKD), a worldwide public health problem, is a major independent risk factor for cardiovascular disease (CVD) that can progress to end-stage kidney disease (ESKD), stroke, and premature death [1] [2]. There are more than 300,000 ESKD patients in Japan, and the number is still increasing [3]. Renal replacement therapy for ESKD is a significant burden for society due to high medical expenses and loss of quality of life. Therefore, it is important to prevent the progression of CKD into ESKD [3].

There are several known risk factors for CKD, such as hypertension, diabetes, age, gender, and obesity [4] [5]. Numerous diseases have been associated with obesity, including CKD, CVD, diabetes, and hypertension [6] [7]. In recent years, the average body mass index (BMI) has been found to increase owing to lifestyle changes and a higher calorie diet, especially among the Japanese males. The proportion of obese male subjects (defined as $\text{BMI} > 25 \text{ kg/m}^2$) had increased by approximately 7% in the 2010 Japan census when compared with the 2000 national census [8]. It is vital for patients to maintain the appropriate body weight, not only through diet but also by exercise in order to prevent the progression of CKD [9]. Several studies have demonstrated the beneficial effects of physical exercise on kidney function [10] [11]. However, information about the effects of body weight reduction on kidney function in obese CKD patients is limited [12] [13].

Recently, the Kidney Disease Improving Global Outcomes (KDIGO) group recommended that CKD patients should be assigned to stages and composite relative risk groups, according to the criteria for glomerular filtration rate (GFR) and proteinuria [13]. Proteinuria is an independent risk factor for the progression of CVD [14] to kidney failure [15], and death. However, only few studies have evaluated the possible relationship between exercise training and proteinuria in CKD patients. While some studies have reported the amelioration of proteinuria in CKD patients following exercise training [10] [16] [17], the opposite has also been reported [18] establishing the need to define the association between exercise and proteinuria in these patients.

In the present study, 12 obese CKD patients were assigned to diet/nutrition therapy alone or diet/nutrition therapy with exercise training. Kidney function was assessed using GFR (based on inulin clearance), estimated GFR (eGFR_{cre}; based on creatinine), and proteinuria, both before and after 12 weeks of intervention. We examined whether the effect of exercise training was beneficial to kidney function and proteinuria in obese CKD patients.

2. Materials and Methods

2.1. Study Design

This trial was in compliance with CONSORT 2010 statement.

This study was designed as a 12-week, prospective, randomized controlled trial. The type of randomization was individual. The primary endpoints of this trial were the stabilization of kidney function and proteinuria during exercise training along with BMI reduction. The secondary endpoints were physical status, oxidative stress, and plasma adipokine levels. Subjects for this study were 30- to 75-year-old CKD patients with obesity ($\text{BMI} > 25 \text{ kg/m}^2$). Non-inclusion criteria was ESKD (under renal replacement therapy) patients. All participants were recruited in a single center (The University of Tsukuba Hospital) between April 1st 2009 and March 31st 2010 and followed-up to March 31st 2011. This study was registered the University hospital Medical Information Network (UMIN) Center in Japan (registry number: UMIN000019746). Additionally, the study protocol was approved by the ethical committee of the University of Tsukuba Hospital (approval number: H21-354), and written informed consent was obtained from all subjects who participated in this study.

2.2. Intervention Methods

The subjects were randomly assigned to two groups by drawing lot: exercise training and dietary instruction (Group E) and dietary instruction alone (Group D). These lots were made by third person, and were randomly allocated. Baseline blood and urine samples were collected; inulin clearance tests, physical examinations, and physical fitness measurements were also performed on all subjects. The values were then compared with those obtained after a 12-week intervention period.

All patients were undergone diet programs designed by a dietician who was a member of authors, and provided with dietary advice involving calorie, protein, and salt adjustments based on the Japanese Evidence-based Clinical Practice Guideline for CKD [19], by a registered dietician, every 4 weeks. Specifically, calorie intake

was restricted to 25 - 30 kcal/kg ideal body weight (IBW)/day, protein intake was restricted to 0.6 - 0.8 g/kg IBW/day, and salt was restricted to <6 g/day. Individual nutritional intake was calculated from the diet report prepared by the patients themselves. Intake of energy, protein, and salt were calculated based on a standard food composition table [20].

The subjects in Group E underwent a program of exercise training involving mixed exercise therapy consisting of aerobic exercises using a static bike (AEROBIKE 900U-EWI; Combiwellness Co., Suzuka, Japan) or walking and weight-bearing muscle exercises for 12-weeks, between 30 minutes to 1 hour each day, under the guidance of fitness trainers. The exercise training was conducted for >23 metabolic events (METs)/hour/week as per the exercise guide designed by the Japanese Ministry of Health, Labour, and Welfare. The MET was defined as 3.5 mL/kg/min of oxygen consumption while sitting at rest. 75% physical working capacity (75% PWC), defined as a capacity for endurance of the activity under 75% strength of maximum heart rate was measured before and after intervention [21].

2.3. Physical Examination

Height, body weight, BMI, heart rate, and blood pressure were measured. Furthermore, the percentage of body fat and muscle were measured using a bioelectrical impedance measurement device (HBF-354 IF-2; Omron Healthcare Co., Ltd.). Bioelectrical impedance method is an effective method of evaluate the body composition [22].

2.4. Measurement of Kidney Function

Inulin clearance tests were performed in order to measure GFR based on the method of inulin and PAH clearance test. Fasting patients came to hospital in the morning and were allowed to drink water *ad lib*. For the testing, patients drank 500 mL of water and 30 minutes later an inulin and PAH solution infusion was started. The patients then drank 60 mL of water every 30 minutes after the start of the infusion. Blood specimens were collected at the infusion onset, and at 45 minutes, 75 minutes, and 105 minutes after the infusion started. Urine specimen collection was done at the infusion onset, and at 60 minutes, 90 minutes, and 120 minutes after the infusion started. Blood and urine samples were analyzed, and inulin clearance (C_{in}) was calculated. The eGFR was calculated from the serum creatinine (eGFR_{cre}) based on the formulas described earlier [23]. The level of proteinuria was also measured using the protein/creatinine ratio in single voided urine samples. Serum albumin and creatinine were measured in the laboratory at the University of Tsukuba Hospital.

2.5. Physical Activity Level

In this study, the physical activity level (PAL) of the subjects was defined as the amount of time spent on performing the activities at more than 3 METs in a week [24]. The activity was measured using an activity monitor with three axial acceleration sensors (HJA-350IT; Omron Healthcare Co., Ltd.), which counted the number of steps taken by the subjects per 10 seconds, and measured the time taken to perform the activities at intensities ranging from 3 METs to more than 6 METs over a 10-second period. The device was generally set for 2-week periods, except under conditions where it was difficult to take the measurements (e.g. while sleeping). Valid data over a period of 7 days during the study period were obtained after collecting the devices. The subjects were asked to write activity reports wherein, extraordinary events such as travel were omitted from the statistical analysis in order to evaluate daily PAL accuracy. Unmeasurable amounts obtained from activities such as cycling and swimming were converted to METs. The conversion formula was based on the Ainsworth compendium of physical activities [25].

2.6. Statistics Analysis

Statistics analyses, excluding the calculation of detective power, were carried out using SPSS II for Windows (IBM Corp., Armonk, NY, USA). To compare the baseline characteristics of the subjects in Groups D and E, the data were analyzed using the two-tailed, paired student's *t*-test, with a 95% confidence interval (95% CI). Values are presented as mean \pm standard deviation (S.D). The level of statistical significance was set at $P = 0.05$. Due to the small sample size the Cohen's *d* effect size was analyzed from the mean and S.D values obtained from of each group [26]. The level of large size effect was set at $d = 0.8$. The detective power and sample size

required for the present study were calculated using G*Power for Windows 3.1 [27].

3. Results

3.1. Baseline Characteristics

Although the subject was initially 13 patients (7 patients in group D, 6 patients in group E), because one patient in group E has declined on half way through the intervention, finally became 12 patients (7 patients in group D, 5 patients in group E). The absconded patient was excluded all analysis.

Table 1 shows the baseline characteristics of the patients in this study. Despite randomization, two female patients were included in Group E, whereas Group D comprised of males only. Age and BMI were not significantly different between the two groups. The initial eGFR_{cre} was lower in Group E than in Group D, but the difference was not statistically significant. The average baseline GFR was 80.1 mL/min/1.73 m² in Group D, and 76.9 mL/min/1.73 m² in Group E. The baseline body fat percentage in Group E was higher than that of Group D. On the other hand, baseline body muscle percentage was lower in Group E than in Group D; however, these differences were not statistically significant. The baseline 75% PWC was higher in Group E than in Group D. When the two female patients were excluded from the analyses, most differences between the two groups were reduced, except for 75% PWC, daily salt intake, eGFR_{cre}, and GFR. Physical activity level (PAL) was significantly lower in the female patients, but was identical between the male patients in the two groups (28.8 ± 12.8 METs/h/week in Group D and 27.4 ± 6.9 METs/h/week in Group E). There was one diabetic patient in Group D and two in Group E. All patients in Group D presented with hypertension, whereas the number of patients with hypertension in Group E was four. All hypertensive patients were prescribed with anti-renin-angiotensin system (RAS) drugs, and several of them took other oral antihypertensive drugs as well (such as calcium channel blockers, cardiovascular agents, or diuretic agents).

Table 1. Baseline characteristics.

	Group D	Group E (male subjects only)
Number (male)	7 (7)	5 (3)
Age (years)	54.4 ± 8.4	51.6 ± 2.8 (50.0 ± 4.9)
BMI (kg/m ²)	28.9 ± 2.6	30.1 ± 2.1 (29.7 ± 2.3)
Body fat percentage (%)	27.8 ± 5.9	32.8 ± 9.0 (31.3 ± 7.1)
Body muscle percentage (%)	28.2 ± 2.6	24.4 ± 7.0 (25.6 ± 5.5)
75% PWC (Watt)	104.6 ± 37.2	121.8 ± 50.5 (153.7 ± 19.2)
Physical activity level (Mets-h/week)	28.8 ± 12.8	21.1 ± 12.3 (27.4 ± 6.9)
Daily calorie intake (kcal/kg/day)	34.9 ± 5.8	30.3 ± 6.8 (28.8 ± 8.1)
Daily protein intake (g/kg/day)	1.23 ± 0.25	1.34 ± 0.32 (1.23 ± 0.35)
Daily salt intake (g/day)	10.4 ± 2.8	8.8 ± 3.3 (8.3 ± 2.4)
GFR (mL/min/1.73 m ²)	80.1 ± 38.5	76.9 ± 26.1 (75.8 ± 16.6)
eGFR _{cre} (mL/min/1.73 m ²)	59.3 ± 26.9	64.2 ± 24.5 (63.8 ± 15.7)
Diabetes present	1	2
Hypertension present	7	4
Anti-RAS drug	7	4
Calcium channel blocker	4	3
Other type of antihypertensive drug	4	3
CKD classification	G1A3, G2A1, G2A2, G2A3, G3aA2, G3bA3, G4A3	G1A2, G1A3, G2A2, G3aA2, G3aA3

BMI: body mass index; CKD: chronic kidney disease; GFR: glomerular filtration rate; eGFR_{cre}: estimated GFR-creatinine; PWC: physical working capacity; RAS: renin-angiotensin system. Age, body mass index (BMI), eGFR_{cre}, diabetes mellitus, hypertension, antihypertensive drugs, and CKD classification in both groups are shown on this table. As all the female subjects in this study were present in Group E, data comprising only the male subjects in the group are shown in parentheses. Values are presented as mean ± standard deviation.

3.2. Effects of Intervention in Kidney Function

We assessed the kidney function from measured GFR by inulin clearance, estimated-GFR based on serum creatinine, and albuminuria before and after the 12-week intervention. In Group D, GFR was slightly increased from 80.1 mL/min/1.73 m² at baseline to 82.4 mL/min/1.73 m²; Group E showed similar results, with increase in GFR from 76.9 mL/min/1.73 m² at baseline to 81.2 mL/min/1.73 m². However, the differences were not statistically significant in both groups ($P = 0.79$, $d = 0.16$, 95% CI: -19.2 to 15.0; **Figure 1**, **Figure 2**). After intervention, the eGFR_{cre} was increased from 59.3 mL/min/1.73 m² at baseline to 67.1 mL/min/1.73 m² in Group D, and from 64.2 mL/min/1.73 m² at baseline to 67.4 mL/min/1.73 m² in Group E. Again, the differences were not statistically significant in both groups ($P = 0.64$, $d = 0.64$, 95% CI: -4.84 to 14.2; **Figure 1**, **Figure 3**). Similarly, the change in urinary albumin levels in both groups was also not statistically significant (-0.191 ± 0.79 g/gCre in group D vs. 0.072 ± 0.34 g/gCre in group E, $P = 0.45$, $d = 0.41$, 95% CI: -1.04 to 0.51; **Figure 1**).

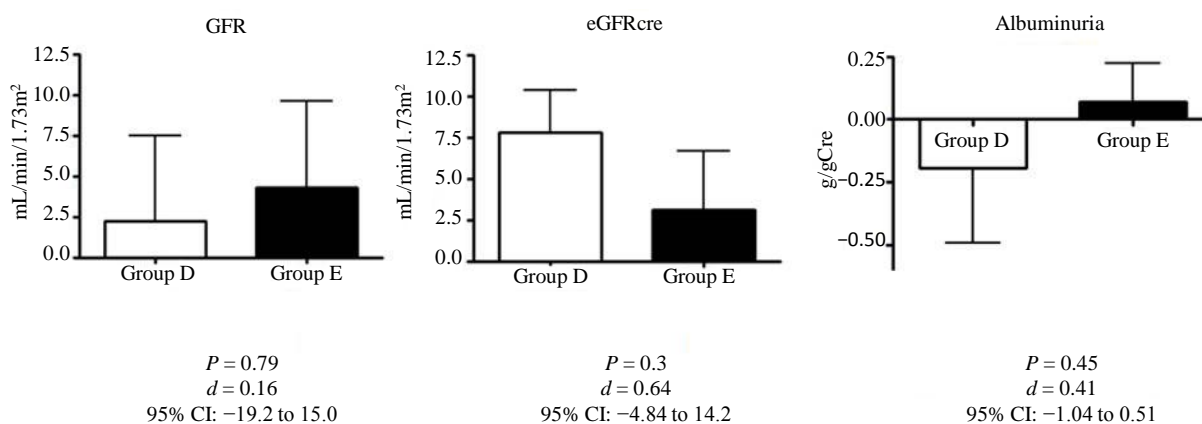


Figure 1. The changes in kidney function before and after intervention.

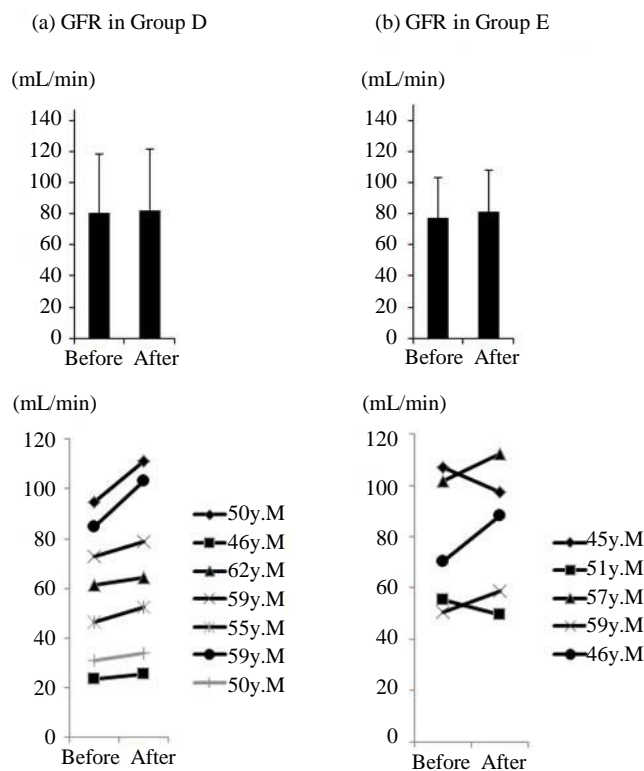


Figure 2. Individual changes in GFR after intervention.

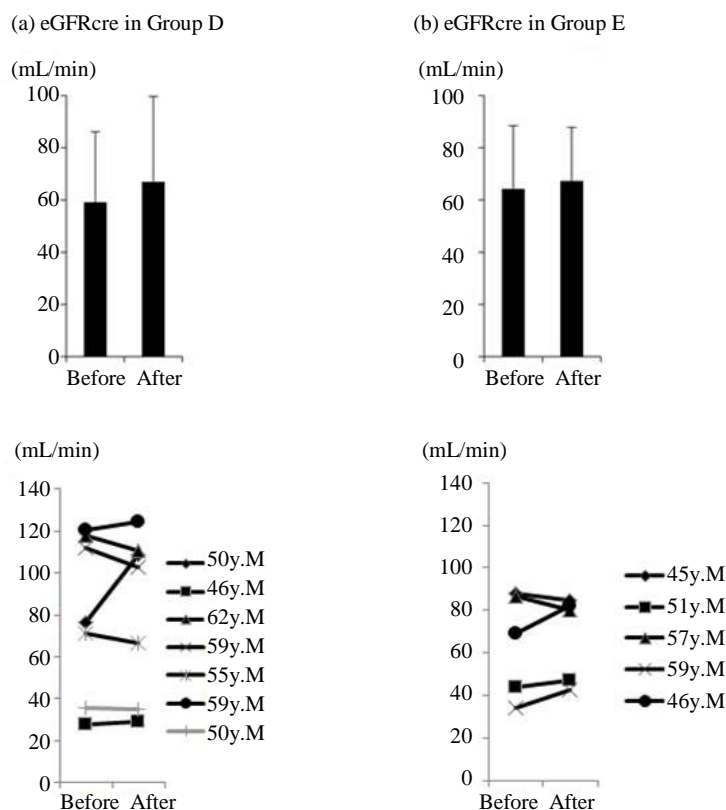


Figure 3. Individual changes in eGFRcre after intervention.

3.3. Effects of Intervention in Physical Status

After intervention, BMI was decreased in both Group D and group E ($-1.1 \pm 0.82 \text{ kg/m}^2$ in group D vs. $-0.88 \pm 0.98 \text{ kg/m}^2$ in group E, $P = 1$, $d = 0.25$, 95% CI: -1.38 to 0.94), while body fat and muscle mass remained unchanged in both groups. Contrary to the decrease in serum albumin levels in Group D, the levels were found to rise in group E (-0.21 g/dL in group D vs. $+0.06 \text{ g/dL}$ in group E, $P = 0.1$, 95% CI: -0.6 to 0.06). Although this difference was not of statistical significance, it did present a large sized effect $d = 1.09$ (Figure 4).

The changes in 75% PWC and PAL were higher in Group E than in Group D (Table 2). After exercise training, the mean PAL value was 153.67 watts in males and 74.0 watts in females. The changes in body composition including body muscle and fat percentage in each group were not significant (Table 2).

The mean nutritional intake including calorie, protein, and salt was decreased in both groups (Table 2). Furthermore, the mean 75% PWC and PAL were increased both the groups (Table 2).

GFR was slightly increased in both groups (from 80.1 ± 38.5 to $82.4 \pm 38.7 \text{ mL/min/1.73 m}^2$ in Group D, and from 76.9 ± 26.1 to $81.2 \pm 26.4 \text{ mL/min/1.73 m}^2$ in Group E); the change was not statistically significant ($2.21 \pm 13.9 \text{ mL/min/1.73 m}^2$ in Group D vs. $4.32 \pm 11.8 \text{ mL/min/1.73 m}^2$ in Group E, $P = 0.79$, $d = 0.16$). Estimated GFRcre values, after intervention, were slightly increased in both groups (from 59.3 ± 26.9 to $67.1 \pm 32.7 \text{ mL/min/1.73 m}^2$ in Group D, from 64.2 ± 24.5 to $67.4 \pm 20.5 \text{ mL/min/1.73 m}^2$ in Group E). The change was not statistically significant ($7.78 \pm 6.83 \text{ mL/min}$ in Group D vs. $3.12 \pm 7.92 \text{ mL/min}$ in Group E, $P = 0.3$, $d = 0.64$). After intervention, albuminuria was decreased in Group D (from 1.01 ± 1.29 to $0.82 \pm 0.78 \text{ g/gCre}$), and slightly increased in Group E (from 0.76 ± 0.96 to $0.83 \pm 1.19 \text{ g/gCre}$). However, the difference between the two groups was not statistically significant ($-0.191 \pm 0.79 \text{ g/gCre}$ in Group D vs. $0.072 \pm 0.34 \text{ g/gCre}$ in Group E, $P = 0.63$, $d = 0.41$). Values are presented as mean \pm standard deviation.

No deterioration in the rate of glomerular filtration was noted in Groups D (a) or E (b). The upper section shows the overall mean values, while the lower section shows individual changes in GFR after intervention.

Estimated GFRcre was increased in Groups D and E (a, b). The upper section shows overall the mean values, while the lower section shows individual changes after intervention.

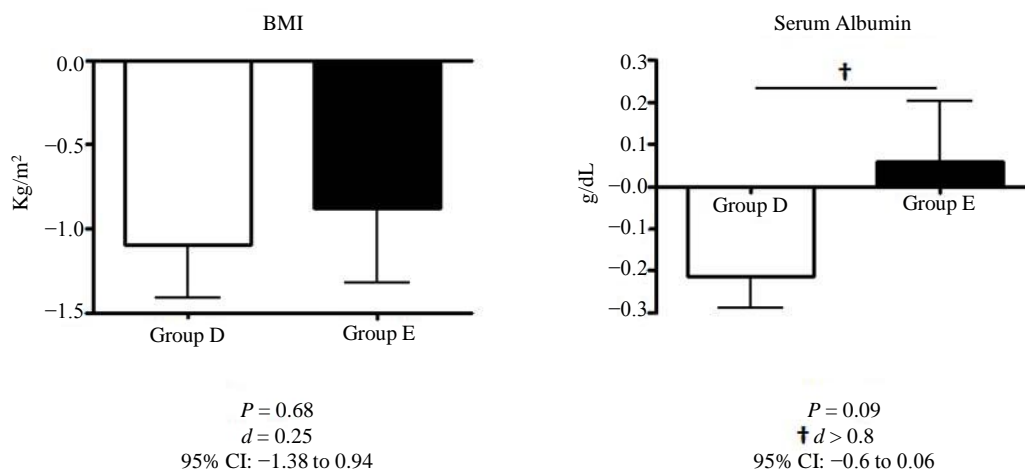


Figure 4. The changes in BMI and serum albumin before and after intervention.

Table 2. Effect of intervention on physical status.

	Group D			Group E			P	d	95% CI
	Before	After	Change	Before	After	Change			
75% PWC (Watt)	104.6 ± 37.2	106.4 ± 18.3	1.86 ± 33	121.8 ± 50.5	134.0 ± 48.4	12.2 ± 8.1	0.51	0.4	-44.0 to 23.3
PAL (METs/h/week)	28.8 ± 12.8	30.7 ± 16.5	1.86 ± 9.1	21.1 ± 12.3	25.2 ± 17.1	4.14 ± 8.5	0.68	0.25	-13.8 to 9.35
Body muscle percentage (%)	27.8 ± 5.9	26.7 ± 7.8	-4.45 ± 10.6	32.8 ± 9.0	33.7 ± 9.8	-1.24 ± 8.72	0.58	0.33	-16.2 to 9.62
Body fat percentage (%)	28.2 ± 2.6	28.2 ± 5.7	-1.16 ± 2.35	24.4 ± 7.0	25.4 ± 6.8	0.86 ± 3.31	0.24	0.73	-5.63 to 1.60
Daily calorie intake (kcal/kg/day)	34.9 ± 5.8	28.5 ± 5.6	-6.4 ± 5.6	30.3 ± 6.8	25.4 ± 8.6	-6.6 ± 4.9	Untested	-	-
Daily protein intake (g/kg/day)	1.23 ± 0.25	0.93 ± 0.16	-0.3 ± 0.2	1.34 ± 0.32	0.95 ± 0.31	-0.52 ± 0.29	Untested	-	-
Daily salt intake (g/day)	10.4 ± 2.8	8.8 ± 2.3	-1.6 ± 2.1	8.8 ± 3.3	6.9 ± 0.9	-1.9 ± 3.6	Untested	-	-

PWC: physical working capacity; PAL: physical activity level; METs: metabolic equivalents. All P values are performed from the change of group D vs. group E. The 75% PWC and PAL were increased in both groups after intervention. Body muscle percentage was decreased in both groups. Body fat percentage was decreased in Group D, and slightly increased in Group E. However, neither was the difference between the two groups statistically significant, nor was the effect size was large enough. Daily calorie, protein, and salt intake were all decreased in both groups after intervention. Values are presented as mean ± standard deviation.

BMI was decreased in both groups after intervention (from 29.0 ± 2.6 to 27.9 ± 2.5 kg/m² in Group D, from 30.1 ± 4.8 to 29.2 ± 4.9 kg/m² in Group E); the change was not statistically significant (-1.1 ± 0.82 kg/m² in Group D vs. -0.88 ± 0.98 kg/m² in Group E, $P = 1$, $d = 0.25$). Serum albumin level in Group D was decreased (from 4.03 ± 0.70 to 3.81 ± 0.59 g/dL), and slightly increased in Group E (from 3.98 ± 0.43 to 4.04 ± 0.26 g/dL) after intervention. This difference between the two groups was not statistically significant (-0.21 ± 0.2 g/dL in Group D vs. $+0.06 \pm 0.32$ g/dL in Group E, $P = 0.1$); however, it did present a large sized effect ($d = 1.08$). Values are presented as mean ± standard deviation. The large sized effect detected was $d > 0.8$.

3.4. The Detective Power of This Study

Table 3 illustrates the detective power of this study. When the effect size and probability of alpha-error were set at the standard level (Cohen's $d = 0.5$, alpha-error probability = 0.05), the probability of 1-beta error was 0.121 in the present study (Table 3).

4. Discussion

The relationship between exercise and CKD is still unclear. In this study, we demonstrated that GFR, eGFRcre,

Table 3. Post hoc analysis of detective power in this study.

Effect Size d	0.8
α -error probability	0.05
Sample size of group D	7
Sample size of group E	5
Critical t	2.228
Df	10
Power ($1-\beta$ error probability)	0.236

The detective power ($1-\beta$ error probability) was 0.236 in the present study.

and proteinuria were not changed in the group assigned with diet therapy alone and in the group provided with both dietary instructions as well as exercise training. Only a few small studies have investigated the effects of exercise on CKD progression. No change in GFR values were observed in the exercise group after an average follow-up duration of 18 months in a study by Eidemak *et al.* where 30 non-diabetic patients with CKD (median GFR, 25 mL/min/1.73 m²; range, 10 - 43 mL/min/1.73 m²) were randomly assigned to either exercise or control groups [28]. Although it was unclear as to whether the study had adequate power to detect a difference in the rate of CKD progression, the authors concluded that any such effect would be too small to be of clinical interest. In another study, Toyama *et al.* non-randomly assigned 10 patients with CKD to the exercise group and nine patients to a control group and found that the anaerobic metabolic threshold, high-density lipoprotein cholesterol level, and eGFR were increased in the patients belonging to the exercise group [11].

There are few studies evaluating the relationship between exercise and proteinuria in CKD patients. Leehey *et al.* revealed that 18 months of aerobic exercise training did not significantly alter GFR, proteinuria, serum lipids, creatinine protein, or hemoglobin levels; however, the power of this study was limited because there were only seven patients in the exercise group and four patients in the control group [16]. Pechter *et al.* also reported that 12 months of low-intensity water exercise training decreased proteinuria [10]. In the present study, proteinuria was decreased in Group D, and was slightly increased in Group E. However, the difference within each group was not statistically significant; moreover, the effect size was not large either. These results suggest that moderate exercise does not affect proteinuria levels in obese CKD patients. Overall, the present study shows that exercise does not worsen kidney function in CKD patients.

BMI was decreased in both groups. Interestingly, the nutrition level, as indicated by serum albumin levels, was decreased in Group D only. In contrast, no changes in serum albumin levels were observed in Group E. Furthermore, although the difference between the two groups was not significant ($P = 0.1$), the effect size was large ($d > 0.8$). The absence of statistical significance may be attributed to type 2 error due to the small sample size and low power of the study. These results imply that exercise training has a positive effect in maintaining nutritional status in obese CKD patients. The diet instruction therapy alone might set up serum albumin synthesis disturbances under dietary caloric restriction, and the addition of exercise training in Group E may result in the maintenance of albumin synthesis under same dietary conditions. These results imply that the addition of exercise training have some favorable effects to obese CKD patients via the nutritional metabolism. There is a possibility that exercise training to obese CKD patients affect the levels of adipocytokines such as adiponectin, leptin, resistin, and ghrelin, therefore the serum albumin level maintain. There are many evidences of the relationship between adipocytokines and nutrition status including serum albumin level [29].

PAL and 75% PWC were found to be increasing in both groups, more so in Group E when compare to Group D indicating the effect of intervention in these patients. However, there was no significance difference in these parameters between the two groups. The 75% PWC is a barometer of maximum oxygen uptake (VO₂ max), in other words, the aerobic capacity of the body. It is reported that 75% PWC is a good barometer of endurance for people with sedentary lifestyles or in patients with chronic diseases [30]. Our data showed that patients could improve their cardiorespiratory fitness by proper exercise training, as seen in Group E. Furthermore, exercise training may also have contributed to improvement of metabolic disturbance in the Group E subjects. These results agree with those reported in other studies [31] [32], and show that exercise training may have improved the prognosis of the subjects in Group E. Due to the short duration of intervention in the present study, the body

Table 4. The priori analysis for adequate test in standard condition.

Effect size d	0.8
α -error probability	0.05
Power ($1-\beta$ error probability)	0.95
Allocation ratio (N1/N2)	1
Critical t	1.989
Df	82
Sample size of group D	42
Sample size of group E	42
Total sample size	84
Actual power	0.951

Under the standard condition of this study (effect size $d > 0.8$, alpha-error probability = 0.05, detective power = 0.95), the adequate number of subjects required in each group was 42.

muscle and fat percentages were not changed in the subjects belonging to Group E; however, continuation of both calorie restriction and exercise training may result in favorable outcomes.

One of the major limitations of this study is sample size, which was the reason for the wide 95% CIs indicating the high possibility of a type 2 error. In this trial, we could not collect a necessary and sufficient sample size which is obtained by detecting power required. The adequate sample size in order to prevent the occurrence of this error (effect size $d > 0.8$, alpha-error probability = 0.05, detective power = 0.95), is 42 subjects in each group (Table 4). This factor must be taken into consideration in future studies. In addition, we were unable to measure the practical muscle volume. Hence, body muscle and fat percentages were calculated using bioelectrical impedance analysis. Further visual examination by CT and/or MRI is required. Finally, the influence of any underlying diseases on the results of this study was not ascertained.

5. Conclusion

In conclusion, we tried to elucidate the effects of exercise training and dietary instruction on kidney function and BMI in obese CKD patients using a randomized controlled study over a 12-week period. We found that both dietary instruction and exercise training or dietary instruction alone did not affect kidney functions (including GFR and albuminuria). BMI improvement was observed in both groups, while serum albumin tended to be maintained in the group provided with dietary instruction and exercise training. Diet therapy alone has a possibility to induce metabolic disturbance. To avoid metabolic disturbances under calorie and protein restriction, appropriate exercise training is recommended. We believe that ideal body weight reduction with stable kidney function could be achieved in obese CKD patients by long-term continuation of both dietary control and physical training. Furthermore, creatinine-based estimated GFR alone is not sufficient for the evaluation of kidney function under dietary instruction.

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Ethics

This study was registered the University hospital Medical Information Network (UMIN) Center in Japan (registry number: UMIN000019746). The study protocol was approved by the ethics committee of University of Tsukuba Hospital (approval number H21-354), and written informed consent was obtained from all subjects who participated in this study.

Conflict of Interests

The authors declare that there is no conflict of interests regarding the publication of this article.

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Abbreviations

Body mass index (BMI)
Cardiovascular disease (CVD)
Chronic Kidney Disease (CKD)
End-stage kidney disease (ESKD)
Glomerular Filtration Rate (GFR)
Ideal body weight (IBW)
Inulin clearance (C_{in})
Kidney Disease Improving Global Outcomes (KDIGO)
Metabolic events (METs)
Physical activity level (PAL)
Renin-angiotensin system (RAS)
75% physical working capacity (75% PWC)
95% confidence interval (95% CI)

Taurolock Effectively Reduces Tunneled Dialysis Catheter-Related Infection and Catheter Exchange Rates among Hemodialysis Patients

Hassan Al Malki*, Muftah Othman, Baha Osman, Awad Rashid, Omar Fituri, Muhammad Asim

Hamad General Hospital, Hamad Medical Corporation, Doha, Qatar

Email: *halmalki1@hamad.qa

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Abstract

Aims: Catheter-related infection, which is one of the major side effects of the use of dialysis catheters, leads to increases in hospitalization, morbidity and mortality. Antibiotic lock is an option for reducing the incidence of these infections, but there are concerns regarding antibiotic resistance. A prior study demonstrated that Taurolock (a taurolidine lock) may reduce the rate of catheter-related infection. **Methods and Material:** This investigation was a prospective before-and-after study. During period one, patients continued to use a heparin lock (5000 units/ml) for 6 months. During period two, they were shifted to Taurolock (a solution of 1.35% taurolidine, 4% citrate, and 500 units/ml of heparin) for 6 months. The primary outcome was the incidence of tunneled catheter-related infection and/or catheter exchange, and the secondary outcomes were the effects of Taurolock on catheter flow rate, dialysis adequacy, and catheter malfunction rate. **Results:** A total of 49 patients were included in this study. During period one, the primary outcome occurred 17 times, with an incidence rate of 86.8 per 100 patient-years; during period two, the primary outcome occurred 7 times, with an incidence rate of 32.6 per 100 patient-years (incidence rate ratio: 2.65, 95% confidence interval (CI): 1.05 - 7.6, $P = 0.023$). There was no significant difference between the two periods with respect to mean catheter blood flow rate ($P = 0.29$). During period one, thrombolytic therapy (TPA) lock was indicated on 19 occasions, with an incidence rate of 97 per 100 patient-years; during period two, TPA lock was indicated on 53 occasions, with an incidence rate of 247.5 per 100 patient-years (incidence rate ratio: 0.3, 95% CI: 0.21 - 0.67, $P = 0.0003$). **Conclusions:** We demonstrated that Taurolock usage is safe and effective for the prevention of dialysis catheter-related infection and/or catheter exchange.

*Corresponding author.

Keywords

Catheter, Hemodialysis, Infection, Prevention, Lock

1. Introduction

Hemodialysis (HD), which is the most common type of renal replacement therapy, requires vascular access to be obtained (via a temporary catheter, tunneled catheter, fistula, or graft) [1]-[3].

Central venous catheters are used to provide blood access for HD patients, although these catheters are generally only reluctantly employed due to safety concerns and associated frequent complications (mainly line infection). Tunneled catheters are often used for relatively lengthy time periods, and catheter-related bacteremia is a major source of morbidity, hospitalization, and economic expense among catheter-dependent patients. Most episodes of catheter-related bacteremia are relatively uncomplicated; however, 10% to 20% of these episodes are complicated by metastatic infection, with manifestations that include endocarditis, septic arthritis, and epidural abscess. The risk of catheter-related bacteremia is proportional to the duration of central venous catheter use; in particular, this type of bacteremia occurs in 35% of patients within 3 months and 48% of patients within 6 months and exhibits an incidence rate of 0.9 to 2.0 episodes per catheter-year [4]-[7].

Antibiotic lock has been proposed as a method for preventing catheter-related infection, although the main concern associated with this treatment is the development of antibiotic resistance in dialysis patients. Taurolidine, which has been used in Europe since the 1970s as an antimicrobial lavage for treating peritonitis and various types of wounds, has been used as a locking solution in combination with sodium citrate, which acts as an anticoagulant. Research has indicated that taurolidine is effective against a broad range of Gram-negative and Gram-positive bacteria and many types of fungi. In addition to being effective, taurolidine appears to be safe, and its use has not been associated with the side effects that have been reported for certain antibiotic lock solutions. In fact, small studies have indicated that taurolidine reduces the rate of catheter-related infection with no side effects [8]-[10].

In this investigation, we examined the use of a taurolidine lock solution (Taurolock) in patients with tunneled catheters; in particular, the rates of catheter-related infection and/or required catheter exchange were compared before and after the introduction of this lock solution among patients treated in our unit at Hamad Medical Corporation (HMC), Doha, Qatar.

This investigation sought to compare the incidences of catheter-related infections and/or catheter exchange before and after the introduction of Taurolock in our HD unit at HMC and to determine the effects of Taurolock on catheter flow rate, HD adequacy, and thrombosis rate.

2. Subjects & Methods

This study was performed at two satellite centers affiliated with HMC. All catheters were placed at our main hospital (Hamad General Hospital) by vascular surgeons. All catheters were jugular and were placed under fluoroscopy with prophylactic antibiotic coverage.

Patients were recruited from December 2009 to June 2011.

This investigation was a prospective study that compared the efficacies of Taurolock (a new lock solution at HMC) and heparin (a lock solution that has been in use for an extended period) with respect to reducing catheter-related infection and/or catheter exchange.

After recruitment, patients continued to use a heparin lock (5000 units/ml) for 6 months (period one). Subsequently, they were shifted to Taurolock (a solution of 1.35% taurolidine, 4% citrate, and 500 units/ml of heparin, Tauropharm, Waldbüttelbrunn, Germany) for 6 months (period two).

Inclusion criteria were adult patients who are dialyzed via a tunneled catheter. All patients who had both treatment modalities were included in the study.

Exclusion criteria were patients who had a catheter-related infection within 3 months prior to the start of the study, patients who are being treated with immunosuppressants (for any reason), patients with malignancies, and patients who are receiving chemotherapy.

The primary outcome of this study was the incidence of tunneled catheter-related infection and/or catheter

exchange. The incidences of these events before and after the introduction of Taurolock were compared for our dialysis patients. The secondary outcomes of this study were catheter flow rate, dialysis adequacy, and catheter thrombosis/malfunction rate. These outcomes were compared for our dialysis patients before and after the introduction of Taurolock. Infection was diagnosed if the patient developed a fever and had positive blood cultures of the same organism from both the central and peripheral lines in the absence of any other detected sources of infection. These infections were treated in accordance with our local protocol, which consisted of the administration of empirical antibiotics, including vancomycin and amikacin, and subsequent changes in the antibiotic regimen based on culture sensitivity. In all cases of tunneled catheter malfunction, thrombolytic lock was attempted in accordance with our local protocol, which consisted of three treatments with tissue plasminogen activator (1 mg/ml) followed by the performance of catheter exchange by our local surgeon.

This study was done according the Helsinki declaration, and the study protocol had been approved by the local institute's Committee on Human Research (our local ethical body). Informed consent has been obtained from all patients included in the study.

Data were tabulated using Microsoft Excel, and the Pearson chi-square test was used to assess these data. Differences in mean blood flow and dialysis clearance rates were compared using t-tests. Countable outcomes were measured as rates of occurrence/100 patient-years, with $P < 0.05$ regarded as statistically significant. Statistical analysis was performed using SPSS 17.0, a commercial statistical package for the social sciences.

3. Results

During the study period, we treated 136 patients with tunneled catheters, 49 of whom were treated with both heparin and Taurolock (36% of all patients) [Table 1].

3.1. Primary Outcome

The incidence of the primary outcome (tunneled catheter-related infection and/or catheter exchange) was 17 events during period one, with an incidence rate of 86.8 per 100 patient-years, and 7 events during period two, with an incidence rate of 32.6 per 100 patient-years (incidence rate ratio: 2.65, 95% CI: 1.05 - 7.6, $P = 0.023$).

3.2. Secondary Outcomes

There were 12 tunneled catheter-related infections during the study: 8 infections (66.6%) occurred during period one, with an incidence rate of 40.8 per 100 patient-years, and 4 infections (33.4%) occurred during period two, with an incidence rate of 18.6 per 100 patient-years. Thus, the incidence rate for tunneled catheter-related infection was 22.1 less per 100 patient-years during period two than during period one (incidence rate ratio: 2.1, 95% CI: 0.58 - 9.9, $P = 0.1$).

During period one, 9 catheters required exchange, with an incidence rate of 45.9 per 100 patient-years; during period two, only 3 catheters required exchange, with an incidence rate of 14 per 100 patient-years. The incidence rate of catheter exchange was 31.9 per 100 patient-years less during period two than during period one (incidence rate ratio: 3.2, 95% CI: 0.8 - 18.8, $P = 0.05$).

There was no significant difference between the two periods with respect to mean catheter blood flow rate, which was 249.2 ml/min during period one and 245.6 ml/min during period two ($P = 0.29$).

Table 1. Basic demographics.

	Number (%)
Male	29 (59.1)
Female	20 (40.9)
Diabetes Mellitus	29 (59.1)
Hypertension	8 (16.4)
Glomerulonephritis	4 (8.2)
Coronary Artery Disease	21 (42.8)
Peripheral Vascular disease	7 (14.8)
Chronic Liver Disease	2 (4.1)

Similarly, the dialysis clearance results (as measured by urea reduction ratio (URR)) were comparable between the two periods: during periods one and two, the mean URRs were 57.7% and 57.4%, respectively ($P = 0.8$).

Thrombolytic (TPA) locks were required by fewer patients during period one than during period two. During period one, TPA locks were required 19 times, with an incidence rate of 97 per 100 patient-years; during period two, TPA locks were required 53 times, with an incidence rate of 247.5 per 100 patient-years (incidence rate ratio: 0.3, 95% CI: 0.21 - 0.67, $P = 0.0003$).

We found no differences between the two periods with respect to patterns of infection or bacterial antibiotic sensitivities ($P = 0.25$). Furthermore, there was no observed development of new antibiotic-resistant organisms during either period.

4. Discussion

The identification of a lock solution for dialysis catheters that can simultaneously reduce infection rates without affecting catheter function has always been greatly desired by clinicians [11].

In this prospective study, we compared the rates of catheter-related infection and/or required catheter exchange during two study periods. During the first study period, we used heparin, which is the standard anticoagulant administered in most dialysis units around the world. During the second study period, we used Taurolock solution, which has become the standard lock solution at our institution.

Our data revealed a significant reduction in the rate of catheter-related infection and/or catheter exchange from period one to period two; in particular, this rate decreased from 86.8 to 32.6 per 100 patient-years, with a significant P value of 0.023. The combined outcome of catheter-related infection and/or catheter exchange was used because both of these events are highly important with respect to long-term morbidity and mortality among HD patients [12] [13]. To the best of our knowledge, this investigation is the only study to date to examine the combination of these two hard end points as the primary outcome.

The rate of catheter-related infection was impressively reduced from 40.8 episodes to 18.6 episodes per 100 patient-years from period one to period two; this result regarding reduced catheter-related infections was consistent with previous findings [14]-[16].

In contrast to prior studies indicating that the use of Taurolock was associated with a higher rate of catheter exchange, our data revealed that catheter exchange was required less frequently during period two than during period one, with 14 exchanges per 100 patient-years during period two and 45 exchanges per 100 patient-years during period one ($P = 0.05$). Therefore, the greatest benefit of Taurolock may be a reduction in the rate of dialysis catheter exchange [17] [18].

No previous studies have reported data regarding the effects of Taurolock on blood flow and dialysis clearance rates. Our results strongly indicated that Taurolock was comparable to heparin with respect to blood flow rate (245.6 versus 249.2, $P = 0.29$). Similarly, dialysis clearance rates were comparable during the Taurolock and heparin phases (57.4 versus 57.7, $P = 0.8$).

One major reported disadvantage of using Taurolock is the increased need for TPA to maintain catheter patency [19]-[21]. Our results were consistent with these prior findings; in particular, in our study, the rate of thrombolytic lock was 247 events per 100 patient-years during the Taurolock phase but only 97 events per 100 patient-years during the heparin phase. However, one reassuring consideration was that TPA was successful in most cases. During the Taurolock phase, three patients were very reluctant to undergo catheter exchange, and all three of these patients required more than six thrombolytic locks to maintain catheter patency and allow them to continue receiving their required dialysis; this phenomenon may explain the high rate of thrombolytic lock during the Taurolock phase.

This study had several limitations. First, this investigation was not a randomized controlled study, which would have been a better methodology than our study design for comparing the two lock solutions. Our center's policy was to shift all patients to Taurolock; therefore, randomization was not an option. Second, only 6 months of follow up were conducted; thus, we could not examine the long-term outcomes of treatment with the new lock solution. Finally, this study had a small sample size, which may affect the generalizability of our results to actual clinical practice.

5. Conclusion

In conclusion, we demonstrated that Taurolock usage is safe and effective for the prevention of dialysis catheter

ter-related infection and/or catheter exchange. The findings that the use of Taurolock instead of heparin did not affect catheter patency or dialysis clearance were reassuring. No development of antibiotic resistance was observed, and no complications with the new lock solution were reported.

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Idiopathic Adult Nephrotic Syndrome: A Clinicopathological Study and Response to Steroid in a Sub-Saharan African Country

Maria Faye^{1*}, Ahmed Tall Lemrabott¹, Mouhamadou Moustapha Cisse¹, Jean De Dieu Nzambaza¹, Cherif Mouhamed Dia², Sidy Mohamed Seck³, Khodia Fall¹, Moustapha Faye¹, Elhadji Fary Ka¹, Abdou Niang¹, Boucar Diouf¹

¹Department of Nephrology, Aristide Le Dantec University Hospital, Dakar, Senegal

²Anatomo-Pathology Laboratory, Grand-Yoff General Hospital, Dakar, Senegal

³Faculty of Medicine, Gaston Berger University, Saint-Louis, Senegal

Email: *mariafaye@hotmail.com

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Abstract

Introduction: Idiopathic nephrotic syndrome represents 25% to 30% of glomerulonephritis in adults. These glomerulonephritides are responsible of about the half of chronic kidney failure examined as well in United States as in Europe or Africa. The aim of this study was to determine the anatomoclinic, therapeutic and progression patterns of idiopathic nephritic syndrome in Dakar. **Patients and Methods:** It is a retrospective ten-year study in the nephrology department of Aristide Le Dantec Hospital. Patients with idiopathic nephrotic syndrome were included. We analyzed anatomoclinic, therapeutic and progression data of idiopathic nephrotic syndrome. **Results:** On 202 patients with nephrotic syndrome, 156 (77%) were primitive. The mean age was 29.7 ± 12 years with a sex ratio of 2.4. Edema was found in 98 patients (62.8%) and hypertension in 63 patients (40%). The mean proteinuria was 6.8 ± 4.8 g/24h. Histologic lesions found at renal biopsy were focal segmental glomerulosclerosis in 71 patients (45.5%), minimal change disease in 68 patients (43.5%) and membranous nephropathy in 8 patients (5%). 134 patients (85.8%) received steroids alone, 12 patients (7.6%) received cyclophosphamide and 4 patients (2.5%) azathioprine in association with steroids. 44 patients (28.2%) reached remission. The factors of poor prognosis were: age, above 40 years, proteinuria above 10 g/24h, existence of renal failure at admission, absence of use of steroids therapy. **Conclusion:** This study shows that idiopathic nephrotic syndrome is frequent in our country with a prevalence of 77%. The most common lesion found at the renal biopsy is the focal segmental glomerulosclerosis. Remission is found only in 28% which is very low. 33% of patients progress towards chronic kidney disease due to the lack of early diagnosis and the use of traditional medicine.

*Corresponding author.

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Keywords

Idiopathic Nephrotic Syndrome, Focal Segmental Glomerulosclerosis, Minimal Change Disease, Membranous Glomerulonephritis

1. Introduction

Idiopathic nephrotic syndrome (NS) is determined by a proteinuria higher than 3 g/24 hours associated with hypoalbuminemia, with no kidney inflammatory lesions or immune complex deposits. It is a clinical translation of a podocyte injury and represents 25% to 30% of glomerulonephritis in adults [1]. It constitutes the most recurrent revelation of about 50% of chronic kidney diseases observed as well in the United States, in Europe or in Africa [2]. Renal biopsy is mandatory in the identification and the characterization of lesions [3]. It also enables planning of therapeutic strategies and establishes a prognosis. The aim of this study was to determine the epidemiological, clinico-biological, histological, therapeutic and progression profiles of idiopathic NS in Dakar.

2. Patients and Methods

It is about a retrospective study in the nephrology department at Aristide Le Dantec University Hospital (level 3) during the period of January 2001 to December 2010. We included all patients off if teen years of age and above who consulted during this period for NS of which no secondary cause was found. For each included patient, epidemiological, clinical, biological and histological data were collected. Therapeutics used was classified in symptomatic and curative treatment. Evolution was favorable towards spontaneous remission, complete or partial, or unfavorable marked by absence of remission (relapse, steroid resistance or steroid dependence) and by the occurrence of complications related to NS and the treatment.

Idiopathic nephritic syndrome was define as a proteinuria higher than 3 g/24h, a serum albuminemia less than 30 g/l, a serum protidemia less than 60 g/l and which no secondary cause was found.

The local ethics committee approved the study.

Statistical analyses:

Data collected were entered through an electronic questionnaire elaborated by Epi Info 3.3.2 version. Analysis plan was as follows:

- Descriptive study of different variables was carried out by calculating the proportions for the variables of each category, and the positional and dispersion parameters for quantitative variables;
- Bivariate analysis was made using the chi2 test for comparisons of proportions, student's test for comparison of mean and logistic regression. The difference was considered statistically significant at a $p < 0.05$.

3. Results

During the study period, 3773 patients were consulted. 251 medical records were collected and 49 were excluded for incomplete medical file. One hundred and fifty-six (156) out of two hundred and two (202) patients presented aidiopathic nephrotic syndrome (77%). The mean age was 29.7 ± 12 years. The age group of 15 - 25 years was the most representative with 46% of patients. Men represented 72% (112) versus 28% of women (44) with a sex ratio of 2.4 (Table 1). Edema was the most frequent type of presentation found in 98 patients (63%). It was associated with ascites and hydrothorax in 24 patients (15.3%). Hypertension was found in 63 patients (40%) (Table 1).

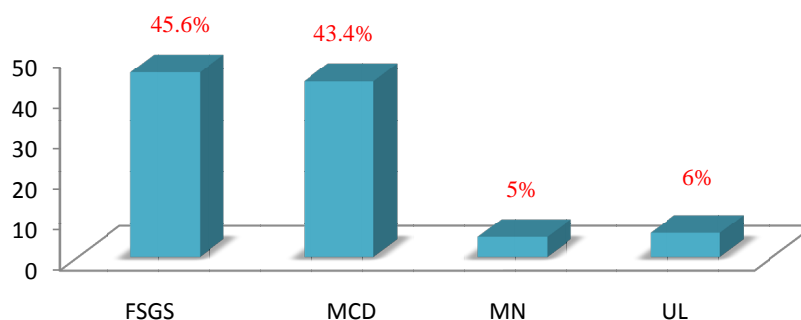
The mean serum protein was $48.5 \text{ g/l} \pm 6.8 \text{ g/l}$ and the mean serum albumin was $20 \text{ g/l} \pm 10 \text{ g/l}$. 50% of patients presented a serum albumin level lower than 20 g/l. Hypertriglyceridemia was present in 82 patients (52.5%). The mean proteinuria was $6.8 \text{ g/24h} \pm 4.8 \text{ g/24h}$ (Table 1). A microscopic hematuria was noted in 13 patients and a leukocyturia in 15 patients.

At renal biopsy, focal segmental glomerulosclerosis (FSGS) was found in 71 patients (45.6%), minimal change disease (MCD) in 68 patients (43.3%) and membranous nephropathy (MN) in 8 patients (5%) (Figure 1).

For management of the nephrotic syndrome, lifestyle measures were adopted: sufficient caloric diet in all patients, fluid restriction in 21 patients (13.4%), sodium restriction diet in 148 patients (95%) and a low

Table 1. Baseline clinical and laboratory details of the patients.

	Total patients (n = 156)
Mean age (ans)	29.7 ± 12 years
Men	72% (n = 112)
Women	28% (n = 44)
Oedema	63% (n = 98)
Hypertension	40% (n = 62)
Mean serum protein	48.5 ± 6.8g/l
Mean serum albumin	20 ± 10 g/l
Mean proteinuria	6.8 ± 4.6 g/24h
Renal insufficiency	44% (n = 68)
Hypertriglyceridemia	52.5% (n = 82)
Complete remission	23.7% (n = 37)
Partial remission	4.45% (n = 7)
Relapse	5.1% (n = 8)
Steroid dependent	4.45% (n = 7)
Steroid resistant	6.43% (n = 10)



FSGS: focal segmental glomerulosclerosis, MCD: minimal change disease, MN: membranous nephropathy, UL: unclassifiable lesion

Figure 1. Frequencies of the primary glomerular diseases.

potassium diet in 9 patients (5.7%). Diuretics were used in 141 patients (91.5%). Furosemide is used alone in 133 patients (85.2%) and associated to aldosterone blocker in 15 patients (9.6%) and to hydrochlorothiazide in 13 patients (8.4%). Antiproteinuric agents were used in 67 patients (43%). All of those patients were on angiotensin-converting enzyme inhibitor (ACE-inhibitors). Anticoagulation was done in 13 patients (8.4%) for treatment and prevention of thrombotic event. One hundred thirty-four patients (85.8%) received steroids at the dose of 1 mg/kg/day of prednisone. Median duration of high-dose steroids was 1.5 month. Cyclophosphamide was used in 12 patients (7.6%), azathioprine in 4 patients (2.5%) after two month of steroid therapy without remission (**Table 1**).

Remissions were noted in 44 patients (28.1%). The absence of remission was noted in 23 patients (14.8%). Relapse was found in 8 patients (5.1%) with a mean of two relapses. Steroid dependence was found in 7 patients (4.45%) and steroid resistance in 10 patients (6.45%) (**Table 1**).

4. Discussion

The prevalence of idiopathic NS was 77%. This prevalence was relatively similar to those found in the USA where Swaminathan [3] found 72% of primitive SN. However, they were discordant with those of Deme [4] and of Akpechi [5] in South Africa who found respectively 12% and 41.2% of idiopathic NS in their study. In our

series, the idiopathic nephrotic syndrome was much more common in young adults with a mean age of 29 years. The age group of 15 - 25 years was the most representative with 46.5%. These results were similar to those found in the study of Deme [4] where the age group of 25 - 34 years was the most representative with 37.8%. These results are also in line with those of Kaba [6] and Abdoulaye [7] where the mean age was respectively 26.2 and 25 years. The young age of the patients in these studies reflected the youthful nature of the population in developing countries in general and Africa in particular.

On histology FSGS was found in 45.6%, MCD in 43.4%, MN in 5%. Five patients presented unclassifiable histological lesions. In the study of Deme [4], FSGS was 75%, the MCD 12%, MN 6%. This percentage difference on FSGS between our study and that of Deme may reflect selection bias of renal biopsy before 2008. Indeed, before 2008 the kidney biopsies were done only in steroid dependent or steroid resistant patients because of the absence of a renal pathologist in Dakar. However, since 2008 the kidney biopsy became systematic in adults due to the presence of a renal pathologist in the department. Kaba [6] has also found the FSGS in 40%, MCD in 35%, and MN in 5%. In 15% the lesion was undetermined. Idiopathic FSGS represents about 5% to 15% of adult's glomerulonephritis in the world. It is more common in black population. Recently, genes of "kidney susceptibility" were found. This showed that some variants of MYH9 gene, although nonpathogenic, play an important role in the development of idiopathic FSGS in the African American [8] population. This could explain the fact that the FSGS is the leading cause of primitive NS in adult black Africa. In our study, 130 patients (66%) received steroids. In Abdoulaye's study [7], steroids had been used in 93.85%. Deme [4] found 72.5% patients receiving steroid in its series. Cyclophosphamide was used in 6 patients (7.9%). Deme [4] in his study found 33 patients on cyclophosphamide.

In our study the progression was favorable with remission in 57 patients (28.21%). Eight patients relapsed, 7 presented had steroid dependence, 10 were resistant to immunosuppressive and steroid treatment. The progress towards chronic kidney disease was noted in 33%. The high rate of chronic kidney failure is explained by the fact that most patients come late to specialists. They turned first to traditional medicines where renal toxicity of drug is most often incriminated as additive precipitating factor to chronic kidney disease. In a study of 115 biopsies, 11% had a second nephrotoxicity of traditional medicines [9].

5. Conclusion

This study shows that idiopathic nephrotic syndrome is frequent in our country with a prevalence of 77%. The most common lesion found at the renal biopsy is the FSGS. Remission was found only in 28% which is very low. 33% of patients progress to chronic kidney disease by lack of early diagnosis and the use of traditional medicine.

Conflict of Interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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