Clinical and epidemiological profile of chronic hemodialysis patients in João Pessoa - PB

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ABSTRACT

Introduction: Chronic kidney disease (CKD), considered by some authors as an epidemic of this century, relates directly to chronic diseases such diabetes (DM) and high blood pressure (HBP) and increase the life expectancy of the population. **Objective:** The aim of this study was to delineate epidemiological profile of patients on hemodialysis (HD) in a Brazilian capital. **Methods:** We conducted a cross-sectional study of a random sample of convenience, using a questionnaire in 245 patients between August 2011 and March 2012. All patients interviewed were in HD program in three Nephrology services at the Unified Health System (UHS) in João Pessoa. **Results:** Of the respondents, 61% were male, 66% were married and 44.5% were white. Approximately 50% were aged 40-59 years and 51% were living out of João Pessoa. The main etiologies were HBP (38%) and DM (13%). Main comorbidities were diabetic retinopathy (15.5%) and peripheral neuropathy (13.5%). Ninety-two percent reported an episode of hospitalization. Temporary vascular access was used in 100% of patients in first dialysis. **Conclusion:** Results of this study indicate the importance of better monitoring of these pre-dialysis patients, which could reduce morbimortality.

Keywords: health services accessibility; kidney failure, chronic; renal dialysis.

INTRODUCTION

The understanding of chronic kidney disease (CKD), a major epidemic of this century, requires it to be considered in the management of chronic conditions such as *diabetes mellitus* (DM) and systemic hypertension, and in light of the overall increase in life expectancy of the population.[1] Most patients with CKD either die as a result of cardiovascular disease or are referred to one of many renal replacement therapies (RRT) such as hemodialysis (HD), peritoneal dialysis (PD), and renal transplantation.

Between 2004 and 2011, Brazil saw the number of patients on dialysis grow from 59,153 to 91,314, according to the census of the Brazilian Nephrology Society (SBN).[2] The estimated annual incidence of patients on RRT is 8%; approximately 90% of these patients are offered HD, and 85% of them are treated in public health care centers.

Brazil probably hosts the third largest chronic dialysis program in the world, with a younger population characterized by lower prevalences of DM than developed nations and better morbidity and mortality rates than American and European centers.[3] However, as indicated by Cherchiglia *et al.*,[4] more investment and infrastructure improvements are needed in health care, as the number of kidney transplants adds up to half the number of new patients starting dialysis annually.

Problems also abound in the referral of patients to specialized care, consequently increasing the need for emergency dialysis and hospitalization.[5] Support care for HD patients should address infectious and cerebrovascular complications, among others, and include measures to improve patient quality of life and the overall prognosis of CKD, a reality often not present in the lives of patients seen in poorly funded public health care centers.

The approximately three million people living in the State of Paraíba[6] are served by nine hemodialysis centers accredited by the Brazilian public health care system (SUS), three of which located in the State's capital of João Pessoa. Three hundred and sixty patients are currently on HD in these three centers. Two other centers in João Pessoa only accept patients covered by private health insurance.

This study aimed to delineate the epidemiological profile of patients on hemodialysis seen in regional public health care centers and describe the local population's socioeconomic characteristics, access to health care, and data related to health care services. This is the first study of its kind carried out in the State of Paraíba.

The reported results may be used in the future to compare between care and quality control strategies adopted by different RRT services in other regions of the country - using data from the SBN census as a reference - and cast light on the patients' care experience.

Methods

This is a cross-sectional study of a random convenience sample of the population. The study was carried out from August 2011 to March 2012 and included 245 patients of some 360 individuals on hemodialysis in the three public nephrology services in the metropolitan area of João Pessoa.

The patients answered a standard questionnaire with the aid of an interviewer who visited the HD centers. Individuals aged 18 years and older treated at public hemodialysis centers were enrolled in the study. Subjects with communication or cognitive disorders (dementia, patients in a coma, and individuals failing to answer at least 50% of the questions) were excluded. All patients gave their written consent before joining the study.

Information was collected directly from the patients, given the difficulties gathering data from patient charts. Only serology, calcium, phosphorus, PTH, and etiology of the underlying disease were obtained directly from patient medical records. The questionnaire contained a list of the most common symptoms reported in the literature. This list was read to the patients, and they were asked to pick the ones which had manifested more frequently the previous month. The patients reported the number of times they were hospitalized. They were read a list of the leading causes of hospitalization for individuals on HD and were asked to select the reasons why they believed they were hospitalized. They were then asked to bring their discharge papers in the following session to confirm the alleged reasons for hospitalization. The reasons for hospitalization stated by the patients were maintained for individuals failing to produce discharge papers.

With respect to level of education, individuals who never attended school were considered illiterate, while subjects who attended school were deemed to be literate.

The quality of pre-dialysis care was assessed based on the following parameters: pre-HD vascular access, knowledge of the main causes of CKD, and the time for which patients were followed up by a nephrologist before starting dialysis. Most patients had nearly perfect recollections of the events leading to dialysis, and described these as some of the most difficult times they had in their lives.

The collected data was treated using Microsoft Excel 2007 (version 9.0). Data sets were described in terms of absolute numbers and percentages or mean values and their respective standard deviations (SD).

Ethical aspects

Enrolled patients signed a consent form allowing the dissemination of scientific information. This study was approved by the Ethics and Research Committee of the Lauro Wanderley University Hospital. There are no conflicts of interest to report.

Results

Six of the 360 patients were excluded for having private health insurance, 22 for being under the age of 18, and others for not being able to answer at least 50% of the questions in the questionnaire, leaving 245 individuals.

One hundred and fifty (61%) of the 245 patients participating in the study were males, 161 (66%) lived with a partner, and 109 (44.5%) were Caucasians. Patients had a mean age of 51.2 ± 2 years; approximately 122 (50%) were aged 40-59 years and 55 (23%) were 60 and older. With respect to level of education, 138 (56%) reported to have attended primary school, and 19 (8%) claimed to have been to college. The mean monthly household income was two minimum wages. Please refer to Table 1 for demographic data.

When distance to HD centers was considered, 124 (51%) of the patients did not live in the city of João Pessoa and 113 (46%) were transported with the aid of their cities of origin. Two hundred and forty (98%) were on sick pay and five (2%) said they were awaiting the clearance of welfare pensions (Table 2).

Kidney biopsy was performed in only two (1%) patients and 147 (60%) reported they were seen by a nephrologist only immediately before or at the most a month before their first HD session. All interviewed patients had their first HD session on a temporary central venous catheter. None of the patients were aware of the association between CKD and hypertension or DM before they were started on HD. Most patients (109/44%) did not even consider the possibility of having renal transplantation; this group included patients with contraindication for transplantation, subjects not interested in having the procedure, and individuals who did not believe they would ever have access to a transplantation service. Seventy-nine percent of the patients (193) did not have donors in or out of their families. Only 35 (14%) had relatives with a history of hemodialysis (Table 2).

One hundred (41%) respondents had been on HD for one to five years and 64 (26%) for less than a year. The mean time on HD was 1.9 ± 0.6 years. One hundred and fifty-four patients (63%) reported to have undergone blood transfusions while on dialysis. Considering symptoms experienced during HD sessions, 125 (51%) had recurring lower limb pain and 114 (46.5%) had muscle cramps (Table 3). About half of the patients (130/53%) said they were oliguric and denied following a specific diet for HD patients, despite advice to do so. Some 180 patients (73%) had diets with normal sodium levels at home (Table 3). Only 10 (4%) had hepatitis C, two (1%) had hepatitis B, and one (1%) was positive for the human immunodeficiency virus (HIV).

Table 1 Patient distribution according to sociodemographic variables

Variables	Number of patients/(%)
Gender	
Male	150 (61%)
Female	95 (39%)
Ethnicity	
Caucasian	109 (44,5%)
African Brazilian	72 (29%)
Brown	64 (26,5%)
Age ranges	
18-29 years	23 (9%)
30-39 years	45 (18%)
40-49 years	63 (26%)
50-59 years	59 (24%)
60-69 years	41 (17%)
> 70 years	14 (6%)
Level of education	
Illiterate	51 (21%)
Primary school	138 (56%)
Middle school	37 (15%)
Higher education	19 (8%)
Marital status	
Living with a partner	161 (66%)
Single	84 (34%)
Household income	
One minimum wage	81 (33%)
Two minimum wages	135 (55%)
Three or more minimum wages	29 (12%)

The etiology for CKD was hypertension in 94 (38%) cases and *diabetes mellitus* in 32 (13%); another 24 (10%) patients had these conditions as the presumed causes for CKD. CKD etiology was unclear in 68 (28%) patients. The most prevalent comorbidities were diabetic retinopathy (15.5%) and peripheral neuropathy (13.5%). Ten (4%) patients claimed they had sequelae from ischemic events such as stroke and acute myocardial

Table 2 Access to health care services; nephrology follow-up before HD; patient awareness over CKD

Characteristics	Number of patients (%)
Origin	
Residing in other cities	124 (51%)
Residing in João Pessoa - PB	121 (49%)
Commute to local HD center	
Transport offered by local government	113 (46%)
Own vehicle	101 (41%)
Public transportation/on foot	31 (13%)
Labor status	
On sick pay	240 (98%)
Awaiting welfare	05 (2%)
On leave from work	208 (85%)
Still working	37 (15%)
Time spent in conservative care with nephrologist	
Immediately or within less than a month of the start of HD	147 (60%)
One to six months	51 (21%)
Six months to a year	15 (6%)
Over a year	32 (13%)
Kidney biopsy	
No	243 (99%)
Yes	02 (1%)
Vascular access used on first HD session	
Temporary central venous catheter	245 (100%)
Permanent access/venous catheter	0
Previous knowledge of CKD	
Hypertension as a cause of CKD	None
DM as a cause of CKD	None
Site where first HD session was carried out	
HD center	245 (100%)
ICU	None
Perspectives on kidney transplantation	
None	109 (44.5%)
Aware - not on kidney waiting list	72 (29%)
Aware - on kidney waiting list	64 (26.5%)
Likely kidney donors	
None	193 (79%)
Yes - family members	47 (19%)
Yes - non-family donors	05 (2%)
Family history of HD	
No	210 (86%)
Yes	35 (14%)

HD: Hemodialysis; CKD: Chronic kidney disease; DM: *Diabetes mellitus*; ICU: Intensive care unit.

Table 3 Clinical variables and adverse events while on HD

Variables	Number of patients (%)
Less than a year	64 (26%)
One to five years	100 (41%)
Five to ten years	49 (20%)
Over 10 years	32 (13%)
Blood transfusion while on HD	
Yes	154 (63%)
No	91 (37%)
Symptoms while on HD	
Lower limb pain	125 (51%)
Muscle cramps	114 (46,5%)
Paresthesia	66 (27%)
Joint pain	50 (20%)
Others (chills; dizziness; pruritus; lower back pain)	08 (3%)
Residual urine output	
Oliguric	130 (53%)
Non-oliguric	115 (47%)
Diet	
Not following the diet recommended by a nutritionist	130 (53%)
Following the recommended diet	115 (47%)
Diet with normal sodium levels	180 (73%)
Diet with low sodium levels	65 (27%)
Positive serology	
Hepatitis C	10 (4%)
Hepatitis B	02 (1%)
HIV	01 (1%)

HD: Hemodialysis; HIV: Human immunodeficiency virus.

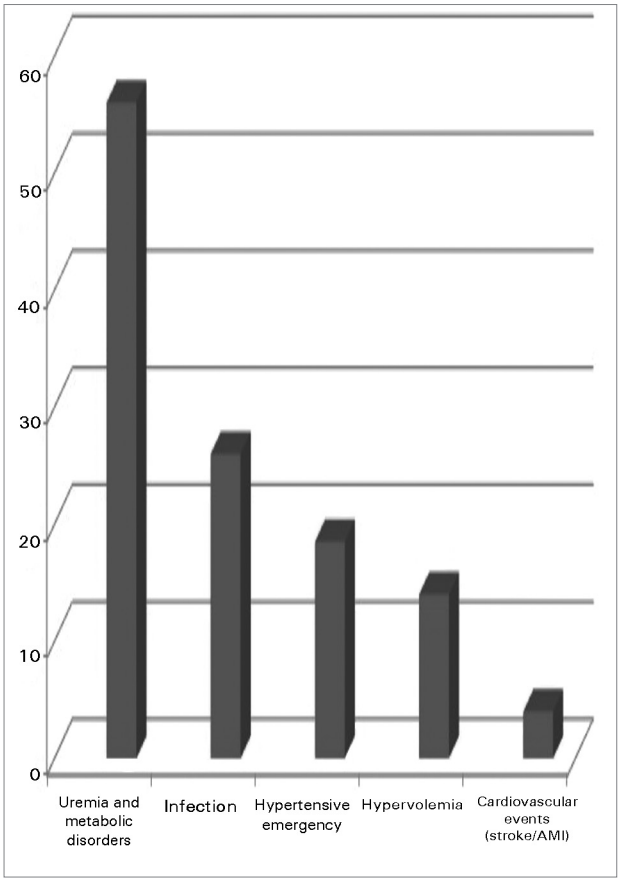
infarction (AMI). Twelve patients (5%) reported some degree of peripheral vascular disease.

Two hundred and thirty-five (96%) of the diabetic patients had been diagnosed before they were started on dialysis; 172 (70%) claimed to have been diagnosed for over ten years. Some 140 patients (57%) said they followed a specific diet for DM, 196 (80%) claimed they took oral medication, and 140 (57%) reported to have been on insulin.

One hundred and twenty (47.5%) of the hypertensive patients claimed to have been diagnosed with hypertension for over 10 years and 130 (52.5%) for five to ten years. Most patients (179/73%) did not follow a specific diet for hypertension and 189 (77%) were on oral antihypertensive drugs.

In terms of frequency of hospitalization net of intensive care unit (ICU) stays, 225 (92%) patients had to be hospitalized while on HD; of these, 135 (55%) required hospitalization once, 93 (38%) had to be hospitalized between two and ten times, and 15 (6%) had to be hospitalized ten times or more for HD-related events. Uremia and metabolic disorders were the most common presumed causes in 137 (56%) patients; infection accounted for 64 (26.5%) cases; hypertension for 46 (18.5%) cases; hypovolemia (anasarca, effusions, sudden pulmonary edema) led to 34 (14%) hospitalizations; and ischemic events (stroke, AMI) were the reasons behind 10 (4%) hospitalizations (Figure 1).

Figure 1. Distribution of causes of hospitalization (%) - Percent values. AVE: Stroke; IAM: Acute myocardial infarction.



Approximately 83 patients (33.5%) reported to have been admitted at an ICU at least once. One hundred and seventy-four (71%) were found to have been sent to an ICU once and 71 (29%) were referred for intensive care two or more times. The most common reasons for referral to an ICU were hypertensive emergencies with 120 cases (49%), metabolic disorders and uremia with 93 (38%), ischemic events (AMI, stroke) with 83 (34%), and hypervolemia with 56 (23%) cases. Infection accounted for only 10 (4%) of the ICU stays, and other causes such as urologic surgery accounted for another ten (4%) cases.

Discussion

The information gathered from patients on HD seen in our region allows the production of inferences on some aspects of their psychosocial reality and the quality of medical care provided to them. In this study, no sociodemographic differences were found in relation to the national scene as described in the 2011 Census of the Brazilian Nephrology Society, which indicated that most patients (66.9%) were aged between 19 and 64 years with a slight predominance of male subjects.[2]

Mean household income was two minimum wages and virtually all patients were on welfare programs. Approximately half of the patients depended on transportation offered by their local governments and had to endure long journeys, which often required them to stay away for the entire day and wait for long hours for other patients sharing the ride. This reflects the centralized nature of the distribution of dialysis centers in Brazil, a consequence mainly of the lack of government funds to open additional HD centers in smaller towns. Study Nefro-Bahia (2006) estimated that, on average, patients spend four hours a day commuting to HD centers, traveling about 80 kilometers per day.[7] These findings probably bear negative impacts on the quality of life of patients.

When evaluating the medical care offered to pre-HD patients, we found that 60% of them were followed up by a nephrologist immediately before or one month short of the first HD session, and that only two patients (about 1%) reported having had a renal biopsy. These findings are suggestive of an important deficit in the clinical monitoring of patients in conservative care. Most patients did not even know that hypertension and DM were causes of CKD.

A survey carried out in the United States on pre-dialysis care and access to health services revealed that 18% of the uninsured patients were treated for metabolic syndrome and hypertension, while 38% of the insured patients were treated for modifiable CKD risk factors.[8] Uninsured patients had less access to health care and were less likely to properly manage conditions such as diabetes, hypertension,

and obesity, similarly to what was observed in our population.

Concerning access to HD, all respondents reported wearing temporary central venous catheters at the start of dialysis, including the individuals followed up by a nephrologist. According to the guidelines of the National Kidney Foundation, permanent vascular access by fistula or graft must be offered six months prior to the first dialysis session. Additionally, Kimball *et al.*[9] reported significant prognostic advantages in patients given arteriovenous fistulas. Vascular access catheters rank among the main causes of infection in HD patients. Lukowsky *et al.*[10] found that infection accounts for 34% of all deaths in the first year of HD, and as much as one third of the deaths of patients on HD when combined with hypoalbuminemia.[11] These findings reflect the impact of delaying the involvement of a nephrologist in the care of these patients and, even when a nephrologist is available, of the lack of resources to provide patients with fistulas before they are started on HD. The 2011 SBN Census revealed that approximately 14% of the prevalent patients on HD that year had been equipped with temporary central venous catheters; however, it failed to describe that same percentage for incident patients, making it difficult to compare between values.

Approximately 26% of the patients enrolled in the study were in the first year of HD, whereas 33% had been on HD for over five years. Administration of blood products was used as an indirect indicator of anemia management. Sixty-three percent of the patients had blood transfusions and 31% reported having used more than five bags of blood products while on dialysis for end-stage renal disease (ESRD). Hemoglobin levels are monitored routinely in this group of patients, once anemia is a predictor of mortality. Erythropoietin, exogenous iron, and blood transfusions - although less often, are some of the strategies used to control anemia.[12-14]

The 2011 SBN Census also pointed out hypertension affects 35.1% of dialysis patients with CKD - the leading cause of CKD in Brazil, followed by *diabetes mellitus* (28.4%), and chronic glomerulonephritis (11.4%).[2] The Census further indicated that 9.3% of the patients had CKD for unknown causes. Our population had a lower prevalence of DM as a causing condition, and a considerably higher rate of CKD for unknown causes (28%). This may be a reflection of the lack of access to nephrology care during the early stages of CKD and the disregard for renal biopsies in our region.

When hospitalization net of ICU admissions was considered, 92% of the respondents reported having been admitted at least once while on dialysis; 45% of these individuals stated they had been hospitalized more than three times. The most common causes were metabolic disorders (56%), infection (26.5%), and hypertensive emergency. Additionally, a third of the patients were admitted in ICUs for hypertensive emergency (49%), metabolic disorders (38%), and ischemic events (AMI, stroke).

A study carried out in an American tertiary hospital revealed that 46.6% of the admissions were related to ESRD, with 24% of recurrent hospitalizations, particularly among individuals with diabetes.[15] Behl *et al.*[16] looked into 410 inpatients with CKD and showed that 59% of them had diabetes. The authors also found that the main cause of hospitalization in the subgroup of patients who died were cardiovascular disease (19.2%), peripheral vascular disease (16.7%), and vascular access complications (18.3%).

According to Quori *et al.*,[11] eight percent of the patients on dialysis are hospitalized for infection. Lukowsky *et al.*[10] further stressed that infection is mainly seen in patients with low albumin levels. In a study performed in Denmark, Nielsen *et al.*[17] showed that patients with ESRD candidates for renal transplantation had 10.2-fold risk of hospitalization for pneumonia when compared to the general population.

It is of clinical interest to track and treat these patients for cerebrovascular and cardiovascular diseases, as they form a risk group for these conditions due to the accelerated pace of onset of atherosclerotic vascular disease characteristically seen in CKD.[18-20] According to Levin,[21] cardiovascular disease is the leading cause of death among individuals with CKD; 35% of the patients present signs of cardiac ischemia; and 20% have compromised cardiovascular function simply for being on HD.

One of the care strategies adopted for these individuals is the management of their comorbidities, which could reduce hospitalization

rates. In this study, the most common comorbidities were retinopathy, peripheral neuropathy, peripheral vascular disease, and sequelae of ischemic events (stroke, AMI).

Historically, comorbidities and hospitalization rates have been correlated with death.[22-24] This correlation offers insight into the difficulties inherent to managing the clinical disorders manifested in this group of patients.

Limitations of the study

The lack of information in patient charts and the scarce technical resources made available did not allow us to collect workup data such as serum albumin, proteinuria, and hemoglobin, to name a few, or physical data such as blood pressure levels and pre-HD weight gain. The information provided by the patients and their families was generally confirmed as their medical records and documents produced by the patients were reviewed. The lack of accurate information in the medical records limited the level of confidence of this study. Additionally, the standard questionnaire has not been validated for this population.

Conclusions

The information presented herein show a disturbing reality in our region, with low rates of conservative monitoring of CKD patients. This was indirectly demonstrated by the low level of awareness over the correlations between CKD, *diabetes mellitus* and hypertension, and by the poor compliance to specific diets recommended for each of the three conditions.

Most patients rely on the Brazilian public health service to undergo clinical procedures and surgery. The disregard for renal biopsies as a tool in the clinical investigation of the disease and the lack of patients with permanent vascular accesses reveal the obstacles patients face in having access to these procedures.

Additionally, the socioeconomic burdens patients endure and the dysfunctional service individuals with CKD are offered have direct impact on their morbidity and mortality rates. As shown by Whaley-Connel *et al.*,[24] patient education on the course of CKD is directly correlated with the disease's mortality and complication rates. Our State suffers from utter lack of patient education.

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