Epidemiological, Clinical and Therapeutic Aspects of Chronic Renal Failure at the Departmental University Hospital of Borgou and Alibori (CHUD/B-A) in Parakou (Benin)

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Abstract

Chronic kidney disease (CKD) remains underestimated in Africa, and particularly in Benin. Epidemiological data from different countries show a growing prevalence. This study aimed to investigate the epidemiological, clinical, and therapeutic aspects of chronic renal failure at the Departmental University Hospital of Borgou and l'Alibori (CHUD/B-A) in Parakou. This was a descriptive cross-sectional study conducted in the nephrology department of CHUD/B-A over 6 years from January 1, 2017, to December 31, 2022, involving chronic kidney disease patients with or without hemodialysis admitted to the nephrology department of CHUD/B-A. CKD was diagnosed according to the criteria of the International Classification of Chronic Kidney Diseases (KDIGO 2012). All patients meeting the inclusion criteria had been retained in the study. Data were analyzed using R 4.3.1 software. The mean with standard deviation was determined for quantitative variables. Qualitative variables were expressed as a proportion. The hospital prevalence of chronic renal failure was 55.2%. The prevalence of end-stage CKD was 72%. The mean age (SD) of patients was 50 years (±14.9) [13 and 90 years]. Of these, 67% were male and 54.5% had no schooling or primary education. Hypertensives accounted for 58.6% of the sample, and 41.2% of patients were self-medicating. Most patients were seen in the context of an altered general condition. The main reason for consultation was asthenia. Biological disturbances were domi-

nated by anemia (90.7%). The main drug groups used were antihypertensives (22.2%). Almost one case in four (24.5%) required hemodialysis. In conclusion, a reduction in unconventional therapeutic practices (self-medication and phytotherapy) is necessary to reduce its prevalence.

Subject Areas

Internal Medicine, Nephrology

Keywords

Chronic Renal Failure, Chronic Kidney Disease, Epidemiology, Hemodialysis, Benin

1. Introduction

The world is currently undergoing an epidemiological transition in which communicable diseases and epidemics, which once accounted for the lion's share of the burden of disease and mortality, are gradually giving way to chronic and degenerative diseases, as well as accidents. Chronic kidney disease (CKD) is a non-communicable disease (NCD) that is attracting increasing scientific attention. Chronic kidney disease is the 11th leading cause of death worldwide [1], and poses numerous management challenges for governments, particularly in low- and middle-income countries. One adult in ten suffers from chronic renal failure, and the mortality rate from kidney disease continues to rise every year [2] [3]. In the nephrology department of the National University Hospital Hubert Koutoukou Maga (CNHU-HKM) in Cotonou, CKD accounted for 91% of admissions in 2019 [4]. The commune of Parakou, which has a referral center receiving most of the nephrological pathologies in the northern part of the country, is also faced with the "epidemic" of chronic kidney disease. The aim of the present study was to investigate the epidemiological, clinical and therapeutic aspects of chronic renal failure at the Departmental University Hospital Center of Borgou and l'Alibori (CHUD/B-A) in Parakou.

2. Materials and Methods

2.1. Type and Period of Study

This was a descriptive cross-sectional study conducted over a six-year period from January 1, 2017 to December 31, 2022, in the nephrology department of the Departmental University Hospital Center of Borgou and l'Alibori (CHUD-B/A) in Parakou, northeastern Benin.

2.2. Inclusion Criteria

The study population consisted of patients diagnosed with chronic renal failure according to the classification criteria for chronic kidney disease [5] (KDIGO

2012). All patients received during the study period and meeting the diagnosis of CKD according to KDIGO 2012 regardless of stage were included in the study.

2.3. Study Variables

- Study variables were:
  - Socio-demographic characteristics (age, gender, socio-professional group, professional status, marital status, place of residence, income, distance travelled).
  - Lifestyle habits (herbal abuse, self-medication, alcohol abuse, tobacco abuse).
  - Clinical data:
    - o Personal medical history and associated pathologies: hypertension, diabetes mellitus, stroke, urinary tract infections, heart failure, liver pathologies, bronchial asthma, human immunodeficiency virus (HIV) infection, prostate pathologies, polycystic kidney disease, cancers, gastric and duodenal ulcers, eclampsia).
    - o Clinical features (previous treatment, reason for consultation, mode of admission, general condition, vital signs, stage of chronic kidney disease, heart rate and blood pressure).
  - Paraclinical characteristics (uremia, creatinemia, glomerular filtration rate (GFR), uric acid, natremia, kalemia, calcemia, total cholesterol, hemoglobin level and blood glucose).
  - Therapeutic data (consultation time, number of molecules, hemodialysis treatment, duration of current treatment, time to first follow-up check-up).
- Operational definitions of variables
  - CKD was diagnosed according to the classification criteria for chronic kidney disease (KDIGO 2012). Stages 3, 4 and 5 were retained for a glomerular filtration rate (GFR) at entry of between: 30 and 59 mL/min/1.73m^2; 15 and 29 mL/min/1.73m^2 and less than 15 mL/min/1.73m^2 respectively. The Chronic Kidney Disease—Epidemiology Collaboration (CKD-EPI) equation was used to calculate GFR [5];
  - The distance travelled is the distance from the patient's place of residence to the CHUD/D-A;
  - Alcohol consumption was considered abusive (according to the WHO) if the subject consumed more than 21 glasses per week. Moreover, 1 glass of alcohol = 10 g of pure alcohol (according to the WHO) [6];
  - Phytotherapy was abused by the subject, who regularly took a mixture of more than two elements per dose;
  - Tobacco exposure was considered abusive in subjects who smoked more than once a day [6];
  - Self-medication is defined as the habit of using one or more medicines without the intervention of a doctor or pharmacist, in order to treat oneself independently [7];
  - The consultation delay is the time elapsed between the appearance of the

first symptoms and the first contact with the health services;

- Initial check-up time is the time elapsed between diagnosis and the first check-up appointment;
- Treatment duration is the time spent in the department under treatment;
- Blood pressure was measured in seated patients after 15 minutes' rest, using an automatic digital sphygmomanometer fitted with a cuff (belonging to the list of sphygmomanometers validated by the French Hypertension Society). It was taken on the bare right arm, placed on a table with the palm facing upwards. Three measurements were taken at 5-minute intervals; the average of the last two measurements was the blood pressure retained for each patient. Blood pressure was considered high if the post-measurement value was greater than or equal to 140/90 mmHg [8];
- Heart rate (HR) was considered normal for a number of heartbeats between 60 and 100 beats per minute. It was taken 15 minutes after the patient's arrival, on the bare right arm, placed on a table, palm upwards, with the same automatic digital blood pressure meter fitted with a cuff used for blood pressure measurement;
- The following normal values were defined for paraclinical variables as follows: The following normal values were defined for paraclinical variables as follows:
  o Hemoglobin in grams per deciliter (g/dL) between [11 - 16];
  o Uremia in grams per liter (g/L) between [0.15 - 0.45];
  o Plasma creatinine in mg/dL between [0.6 - 1.4];
  o GFR greater than or equal to 90 mL/min/1.73m^2;
  o Uricemia in milligrams per liter (mg/L) between [40 - 60];
  o Natremia in milliequivalents per liter (mEq/L) between [135 - 158];
  o Kalemia (mEq/L) between [3.5 - 5.3];
  o Calcemia (mEq/L) between [85 - 105];
  o White blood cells per microliter (μL) [3000 - 8000];
  o Total cholesterol below 2 g/L;
  o Fasting blood glucose (g/dL) between [0.70 - 1.26].

2.4. Data Collection and Analysis

Data were collected using a medical record form, covering patients' socio-demographic, clinical and therapeutic variables. Data were analyzed using R 4.3.1 software. The mean and standard deviation were determined for quantitative variables. Qualitative variables were expressed as a proportion.

3. Ethical Considerations

The survey protocol was validated by the public health unit of the Cotonou Faculty of Health Sciences. Collection authorizations were obtained from the aforementioned unit and from the head of the CHUD/B-A nephrology department. The anonymity and confidentiality of the data collected complied with the

ethical principles applicable to medical research on human subjects contained in the Declaration of the World Medical Association of Helsinki.

4. Results

From January 1, 2017 to December 31, 2022, a total of 621 cases were received in the nephrology department of CHUD/B-A, including 343 cases of chronic renal failure. The hospital prevalence of chronic renal failure was 55.2%. The prevalence of the different stages of CKD showed a predominance of the end-stage (72%) (Figure 1 and Figure 2).
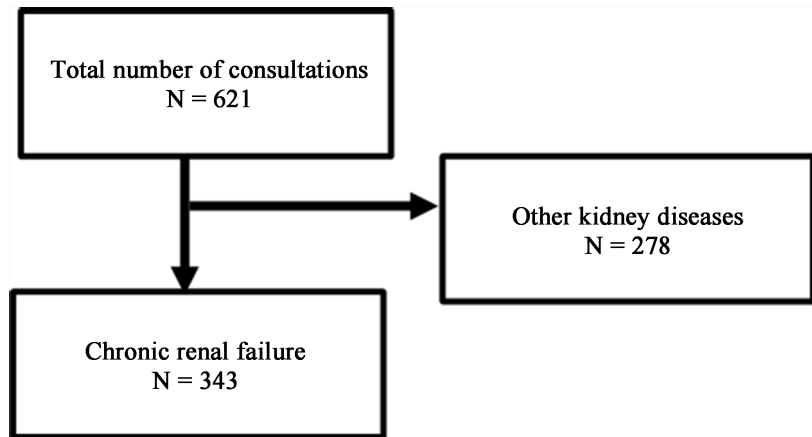
Figure 1. Flow chart of patients admitted to the CHUD/B-A Nephrology Department from 2017 to 2022.
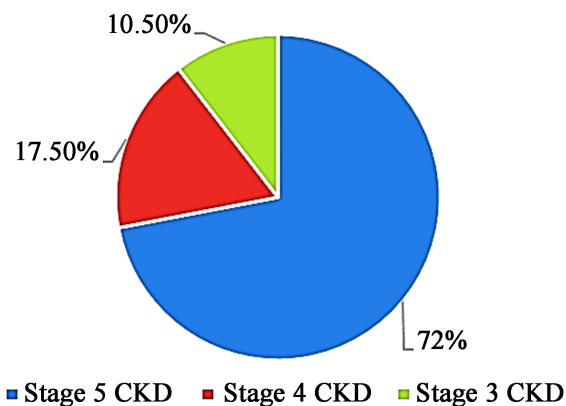
Figure 2. Distribution of patients according to hospital prevalences of different stages of CKD, CHUD/B-A, 2017-2022.

4.1. Socio-Demographic Characteristics

The mean age (SD) of patients was 50 years (±14.9) [13 to 90 years]. Patients between 40 and 60 years of age were the most numerous. Nearly 67.1% of patients were male, giving a sex ratio (M/F) of 2.03. Most patients (36.4%) did not attend school. Civil servants, housewives and shopkeepers were the three predominant occupational groups, accounting for 14.3%, 23.6% and 15.2% of cases respectively. Two out of three patients (67.6%) were still working (Table 1).

Table 1. Distribution of patients by socio-demographic characteristics-CHUD/B-A, 2017-2022.

|	Effectif (n = 343)	Percentage
Age range (year)		
[0 - 21[	7	2.0
[21 - 41[	93	27.2
[41 - 61[	161	46.9
[61 - 81[	75	21.9
≥81	7	2.0
Gender		
Male	230	67.1
Female	113	32.9
Residence		
Urban	229	66.8
Rural	114	33.2
Distance travelled (Km)		
≤50	211	61.5
>50	132	38.5
Study level		
No schooling	125	36.4
Primary level	62	18.1
Secondary level	79	23.0
Higher education	77	22.5
Marital status		
Unmarried	32	9.3
Married	311	90.7
Professional status		
Still working	232	67.6
Unemployed	61	17.8
Retired patient	50	14.6
Socio-professional group		
Workers and craftsmen	49	14.4
Civil servants	81	23.6
Housewives	52	15.3
Traders. retailers	50	14.6
Fishermen farmers and breeders	49	14.3
Drivers. transporters	37	10.8
Other professions	13	3.8

4.2. Associated Pathologies and Lifestyle

Arterial hypertension (AH) and diabetes mellitus were the associated pathologies most frequently found in patients, accounting for 59.1% and 18.1% of cases respectively (Figure 3). The lifestyle habit most frequently incriminated was self-medication (41.2%) (Figure 3 and Figure 4).
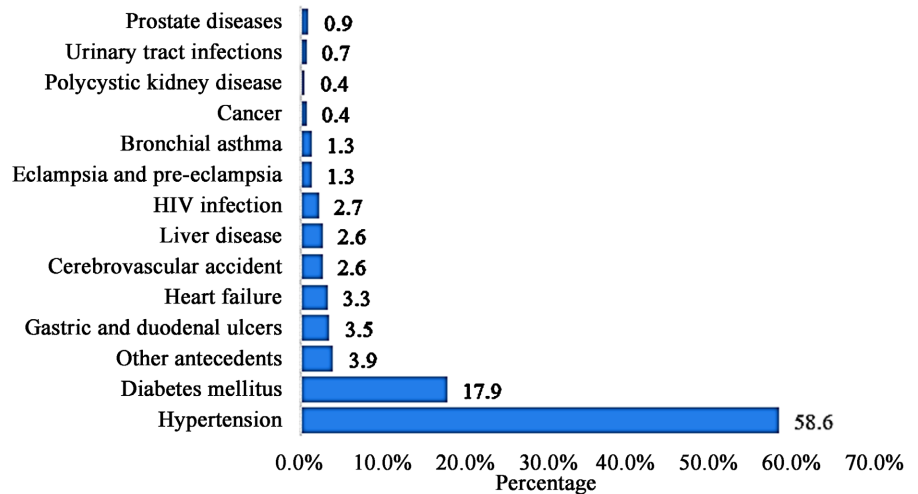
Figure 3. Distribution of patients according to their personal medical history and associated pathologies, CHUD/B-A 2017-2022.
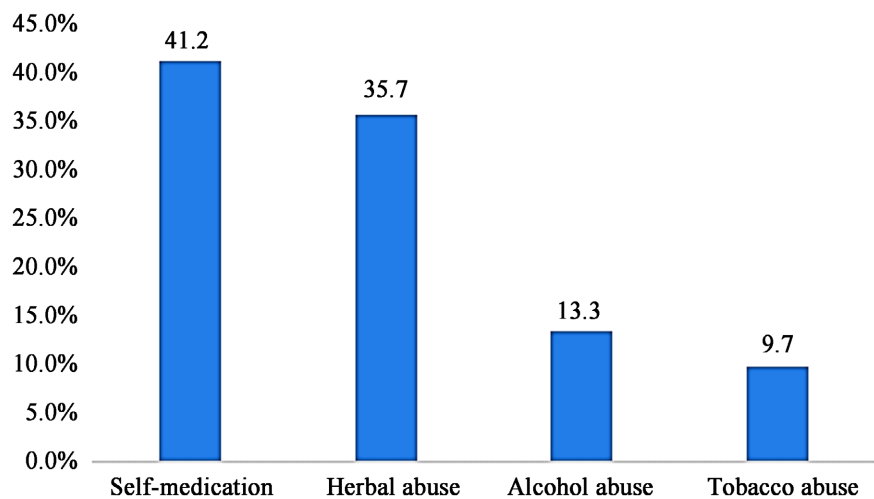
Figure 4. Distribution of patients according to lifestyle habits, CHUD/B-A 2017-2022.

4.3. Clinical Characteristics

Most patients (47.2%) had consulted their doctor within three months, most often in a context of deteriorating general condition. The vast majority (85.4%) had received treatment prior to admission. The main reasons for consultation were asthenia, headaches and dyspnea, as well as edema. In 44% of cases, renal function was already impaired on admission. According to the mode of admission to the department, 66% of patients had been referred by healthcare professionals, the majority of whom (70%) were general practitioners. Tachycardia was

observed in 32.7% of patients, and high blood pressure in 72% (Table 2).

Table 2. Distribution of patients according to their clinical characteristics, CHUD/B-A, 2017-2022.

	Frequency (n = 343)	Percentage
Consultation lead time (in days)		
≤7	6	1.7
[8 - 91[	162	47.3
[91 - 181[	67	19.5
≥181	108	31.5
Consultation reasons		
Impaired renal function	215	44.1
Asthenia/headache/dyspnea	114	15.5
Edema	39	9.7
Digestive signs (anorexia/nausea/vertigo)	32	4.4
Urinary symptoms	21	3.1
Altered state of consciousness	19	1.4
Weight loss	8	1.6
Past treatment		
No	50	14.6
Yes	293	85.4
Patient's general condition		
Good	69	20.1
Altered	275	79.9
Method of admission		
Direct	117	34.1
Referred	226	65.9
Heart rate		
Normal	231	67.4
Tachycardia	112	32.7
Blood pressure		
Normal	96	28.0
High	247	72.0

4.4. Patient Characteristics Related to Their Biological Tests

Mean GFR (SD) was 11.9 mL/min/1.73m^2 (±13.3). Main disturbances revealed by paraclinical examinations were: anemia (90.7%), hyperuricemia (86.3%), hyperuricemia (77.6%), hypocalcemia (40.2%), hyponatremia (31.2%), hypercholesterolemia

(29.7%) hyperleukocytosis (29.7%), hyperkalemia (19.5%) and hyperglycemia (13.4%) (Table 3).

Table 3. Distribution of patients according to the characteristics of their paraclinical examinations, CHUD/B-A 2017-2022.

	Frequency (n = 343)	Percentage
Uremia		
Normal	47	13.7
High	296	86.3
Uricemia		
Low	32	9.3
Normal	45	13.1
High	266	77.6
Hemoglobin level		
Low	311	90.7
Normal	32	9.3
Blood glucose		
Low	26	7.6
Normal	271	79.0
High	46	13.4
Natremia		
Low	107	31.2
Normal	220	64.1
High	16	4.7
Kalemia		
Low	44	12.8
Normal	232	67.6
High	67	19.5
Calcemia		
Low	138	40.2
Normal	191	55.7
High	14	4.1
White blood cell count		
Normal	241	70,3
High	102	29.7
Total cholesterol		
Normal	241	70.3
High	102	29.7

4.5. Patient Therapeutic Characteristics

All patients consulted during the study period had received advice on dietary and nutritional measures, as well as drug prescriptions. The majority of patients were seen in the terminal stage of the disease (stage 5). Most of them (82.2%) had spent less than a year on treatment in the department. The main drug groups used were antihypertensives (22.2%), alkalinizes and calcium (18.7%) and antianemics (17.8%) (Table 4).

Table 4. Distribution of patients according to therapeutic management—CHUD/B-A, 2017-2022.

	Frequency (n = 343)	Percentage
Therapeutic decisions		
Outpatient treatment	237	64.4
Hospitalization	29	7.9
Hemodialysis	100	27.2
References	2	0.5
Drug group		
Antihypertensives	291	22.2
Alkalizing agents/calcium/vitamin D/magnesium	245	18.7
Antianemics	234	17.8
Diuretics	150	11.4
Vitamins and micronutrients	147	11.2
Hypouricemic	108	8.2
Antidiabetics	57	4.3
Antibiotics	26	2.0
Potassium chelators	24	1.8
Anxiolytics. antiemetics. statins	18	1.4
Hemodialysis		
No	259	75.5
Yes	84	24.5
Duration of treatment (years)		
<1	282	82.2
≥1	61	17.8
Time to first follow-up (days)		
≤30	217	63.3
≥31	126	36.3

5. Discussion

5.1. Hospital Prevalence

Chronic renal failure is a frequent condition in the CHUD/B-A nephrology department. Its hospital prevalence was 55.2%. This prevalence is close to that of Eyeni Sinomono *et al.* [9] who reported that CKD accounted for 50.7% of admissions to the nephrology department of Brazzaville University Hospital. This is lower than that reported by Vigan *et al.* [4] in whom CKD accounted for 91% of admissions in the nephrology department of the CNHU-HKM in Cotonou, Benin.

However, our prevalence is higher than that of Gbaguidi *et al.* [10], who reported a prevalence of 16.1%. This difference is due to the fact that this study was carried out in a general population, in a rural setting, unlike ours, which was carried out in a hospital setting, in a specialized department.

5.2. Socio-Demographic Characteristics of Patients

Age and gender: In our study, the mean age of patients was 50 ± 14.9 years. The majority were 60 years old. Our average age is close to those of 47 and 52 years reported in Benin [4] [10]; 51.4 years in DRC [11]; 51.2 years in Congo [9]. On the other hand, it is lower than the average of 72 years reported in France [12].

Male patients were the most affected, accounting for 67.1% of cases. The same male predominance was reported by Tia, *et al.* Ahoui *et al.* and Vigan *et al.* [4] [13] [14].

5.2.1. Profession

Housewives, shopkeepers and farmers were the predominant professions, in line with the socio-professional groups reported by Ahoui and Vigan *et al.* [4] [14]. Chronic kidney disease affects active people. Like all non-communicable diseases, it is responsible for a drop in the productivity of affected patients, which sustains poverty. Its progression to end-stage renal disease, possibly followed by dialysis, represents a major health burden for patients' families.

5.2.2. Level of Education

Patients with no schooling (36.4%) were the most likely to have consulted a doctor. This proportion is close to the 27.9% reported by Ahoui *et al.* [14]. The same finding (72.1%) was made by Gbaguidi *et al.* [10], but in a higher proportion. This result raises the issue of the content of the information to be used to raise awareness among the most vulnerable groups.

5.2.3. Medical History and Lifestyle

Patients with a history of hypertension (59.1%) or diabetes mellitus (18.1%) were the most numerous. Ramilitiana *et al.* [15] had reported that in subjects with chronic renal failure, hypertension and diabetes were found in 41.3% and 17.2% of cases respectively. Amekoud *et al.* [16] also reported that hypertension was known in 63.5% of patients, and was the main antecedent. Stengel *et al.* [12] re-

ported that almost one in two cases of end-stage renal failure was secondary to hypertension or diabetes, mainly type 2, non-insulin-dependent diabetes.

Among the lifestyle habits most frequently found in our study were herbal medicine and alcohol and tobacco consumption. Ahoui *et al.* [14] had reported the same lifestyle habits.

5.2.4. Clinical Characteristics

Patients were seen mainly for impaired renal function, asthenia, edema, dyspnea and anorexia. Biologically observed renal function impairment (44.06%) is a reason for consultation occurred only in a referral context or is an incidental finding during a consultation for another condition. The same finding was reported by Ahoui *et al.* [14], for whom asthenia was the most constant general sign.

5.2.5. Therapeutic Characteristics

The majority of patients were admitted with stage 5 disease (72%). This proportion is close to that reported by Vigan *et al.* [4] who reported that stage 5 chronic renal failure was observed in 78% of patients. The same observation was made in Togo and Nigeria for 44.8% and 42% of samples respectively [17] [18]. Screening patients for non-communicable disease risk factors at every contact with a physician would help to identify CKD patients as early as possible, and thus improve management. Most patients (82.22%) had spent less than a year in the department. The same observation was made by Thanh *et al.* [19] who reported that adherence to CKD treatment in patients aged 18 or over was such that around 30% of patients would not be persistent one year after starting treatment or compliant within one year of initiation.

6. Conclusion

The hospital prevalence of renal failure was high in the CHUD/B-A nephrology department. It was much more prevalent in active people under 60. Self-medication and alcohol abuse were the lifestyles most commonly found in our patients. Arterial hypertension and diabetes were the comorbidities present in our patients. The patients, for the most part referred, had arrived at the terminal stage in an altered general state. Proper management of non-communicable diseases such as hypertension and diabetes could help reduce disease prevalence. Chronic renal failure remains a public health concern in our region, due to its complications and costly management. A reduction in unconventional therapeutic practices (self-medication and phytotherapy) is necessary to reduce its prevalence.

Acknowledgements

Conflicts of Interest

The authors declare no conflicts of interest.

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