Original Article

Prevalence and determinants of chronic kidney disease among patients with type 2 diabetes in a sub-Saharan resource-limited setting (case of Dschang District Hospital)

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Background: Diabetes is a chronic metabolic condition associated with an increased risk of chronic kidney disease (CKD). However, coronavirus disease 2019 (COVID-19) was associated with a reduction in patient consultations and admissions. This study aimed to estimate the prevalence of CKD and its determinants among a sub-Saharan population of participants with diabetes during this pandemic.

Methods: A cross-sectional study was conducted from March to July 2021 among adult participants with type 2 diabetes in the Dschang District Hospital (DDH). Sociodemographic, clinical and biological data were collected using a questionnaire. The glomerular filtration rate was estimated using the CKD-Epidemiology Collaboration (CKD-EPI) formula, while proteinuria was collected on the urinary spot. The presence of one or both markers was used to determine CKD. Bivariate analyses were performed to identify the factors associated with a significance level ($P<0.05$).

Results: A total of 85 participants (38 men) were selected with a median age of 61 [49–69] years. Proteinuria was present in 37 (43.5%) of them. The reduced estimated glomerular filtration rate (eGFR) was

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found in 25 (29.4%) of the participants. CKD prevalence was 58.8% in the population study. The factors associated with eGFR reduction in bivariate analysis were hypertension (OR: 5.42; 95% CI: 1.92–15.3; P<0.001), consumption of nephrotoxic drugs (OR: 0.24; 95% CI: 0.09–0.67; P=0.003), diabetes duration less than 5 years (OR: 0.38; 95% CI: 0.15–1.02; P=0.029), diabetes duration equal or more than 10 years (OR: 3.14; 95% CI: 1.14–8.64; P=0.015), the presence of neuropathy (OR: 2.41; 95% CI: 0.83–8.52; P=0.048), and advanced age (OR: 4.14; 95% CI: 1.45–11.84; P=0.003). In multivariate analysis, only hypertension was associated with eGFR reduction. Retinopathy was the only factor associated (OR: 0.43; 95% CI: 0.16–1.15; P=0.048) with the presence of proteinuria. Only hypertension (OR: 3.2; 95% CI: 8.16–1.15; P=0.04) was associated with CKD.

Conclusions: CKD is common at the DDH. Although the presence of proteinuria was associated with retinopathy and eGFR reduction with hypertension, only hypertension was a determinant for CKD among patients with T2D at the DDH. Appropriate diagnosis and management of hypertension is necessary.

Keywords: Type 2 diabetes (T2D); chronic kidney disease (CKD); proteinuria; glomerular filtration rate (GFR)

Received: 28 May 2023; Accepted: 03 November 2023; Published online: 05 January 2024.
doi: 10.21037/jxym-23-19
View this article at: https://dx.doi.org/10.21037/jxym-23-19

Introduction

Diabetes is a set of metabolic pathologies characterized by chronic hyperglycemia resulting either from the pancreas's difficulty in producing insulin or the inability of the body to properly use this hormone or both. The World Health Organization (WHO) classifies diabetes mellitus according to its etiology into four forms: type 1 diabetes (insulin-dependent or lean diabetes); type 2 diabetes (T2D) (non-insulin-dependent or fatty diabetes); gestational diabetes; and secondary diabetes (1). It represents a real global public health issue due to its increasing frequency, its mortality (1.5 million people per year) and its economic cost (966 billion USD per year). In 2021, the International Diabetes Federation (IDF) estimated its global prevalence at 9.3%, with a prediction of 10.9% by 2045. In Africa, particularly in the sub-Saharan region, the prevalence of diabetes was estimated at 3.9% in 2019, reached 4.5% in 2021 and is projected to reach 5.2% by 2045. In Cameroon, this prevalence is estimated at 5.5% in adults (2). This disease causes several chronic complications such as foot problems (diabetic foot), ischemic cerebrovascular and cardiovascular diseases, peripheral neuropathies, retinopathy and chronic kidney disease (CKD) (3).

The latter is one of the most serious complications of diabetes given it is the major factor in cardiovascular mortality in diabetics. The prevalence of CKD among patients with diabetes ranges from 11% to 90% with a pooled prevalence of 24.7% (95% CI: 23.6–25.7%) and, can evolve into end-stage renal disease (ESRD) (4). Diabetic nephropathy is the leading cause of CKD in patients with diabetes (5). However, patients with diabetes can present other causes of CKD (6). Diabetic nephropathy is related to the involvement of small renal vessels related to chronic hyperglycemia. This hyperglycemia will lead to intraglomerular hypertension followed by hyperfiltration

Highlight box

Key findings

- The prevalence of chronic kidney disease (CKD) was high among patients with type 2 diabetes at the Dschang District Hospital. Only hypertension was associated with CKD, while hypertension was associated with estimated glomerular filtration rate (eGFR) reduction and retinopathy with proteinuria.

What is known and what is new?

- CKD prevalence was known to be high among patients with diabetes. However, during the coronavirus disease 2019 (COVID-19) pandemic, this prevalence seems to be more important.
- The presence of retinopathy was associated with proteinuria. Hypertension was associated with eGFR reduction.

What is the implication, and what should change now?

- CKD must be detected as soon as diabetes is diagnosed.
- Its progress must be monitored very frequently.
- Appropriate management of diabetes and its comorbidities is necessary for the prevention and progression control of these abnormalities.

following the dilatation of glomeruli. The latter will react by thickening their filtration membrane and gradually lose their functional quality, then the glomeruli will sclerose and the filtration will go down, a sign of kidney disease (5,7,8).

The prevalence and risk factors of CKD during diabetes are known in Western countries. Despite its severity and its high burden on the mortality of patients with diabetes, particularly in the context of new therapeutic options (9), few studies have been conducted to date on CKD among patients with diabetes in sub-Saharan Africa and particularly in a resource-limited setting where the diabetic population is booming (2,10,11). In Cameroon, Kaze *et al.* found a CKD prevalence respectively of 10% in Douala, 11.7% in Garoua and 13.2% in Dschang; with patients with diabetes accounting for 40% of those with ESRD (12-15). El Fadl, in a study in Fez, found a CKD prevalence of 48.6% (16). In Cameroon, Marat Kofia Ibrahim *et al.* estimated the prevalence of CKD in patients with diabetes at 59.6% (17). Based on all of the above, we found it necessary to assess the prevalence and determinants of CKD among sub-Saharan patients with diabetes in rural area. Moreover, the coronavirus disease 2019 (COVID-19) pandemic led to a reduction in patient consultation and admission, particularly for those suffering from chronic disease (18). This change could have brought to the hospital only patients with severe or complicated diseases while the others are staying at home. It is therefore interesting to assess this disease prevalence and its determinants during this pandemic.

Methods

Study design

This cross-sectional study was conducted in the Endocrinology and Outpatient services of the Dschang District Hospital (DDH).

Setting

The study was conducted over a period from March to June 2021 in the Endocrinology and Outpatient services of the DDH. This health facility is located in the Dschang Health District (DHD), a rural area in West Cameroon, Central Africa. The DDH is the reference health facility for 65 health facilities in the District.

Participants

People with T2D, living in the DHD for more than 6 months and consulting at the DDH, were approached for participating in the study. Those who agreed to participate were submitted to a questionnaire and blood and urine testing.

All eligible participants (known diabetic patients consenting, followed up at DDH, regardless of age and gender) were informed of the objectives, and activities of the study through informed consent and a fact sheet. A questionnaire was submitted to the participant before taking the blood sample. In addition, a urinary sample was also taken to assess the patient's proteinuria through a urinary dipstick. We excluded non-consenting patients and diabetic patients with other conditions that may interfere with the assessment of renal function such as intercurrent infection, including urinary tract infection, dehydration, and an acute complication of diabetes. The data were taken anonymously to ensure the confidentiality of the data collected.

Variables

In this study aiming to assess the prevalence of CKD among a population with T2D, the outcome was CKD. The exposure was the variables associated with CKD. In this study, we collected the following variables:

- Socio-demographic data: age, profession, gender;
- Clinical data on diabetes: diabetes type, duration of disease, treatment and follow-up;
- Vital signs and physical exam data were noted after the physical examination of the patient;
- Biological data: urinary dipstick (for proteinuria) and the determination of serum creatinine. The serum creatinine and urinary dipstick were performed twice at 3-month intervals.

Biological specimens were taken in the sample room of the hospital laboratory after 12 hours of fasting. A blood sample of 4–5 mL from the venous origin, preferably taken at the bend of the elbow, as collected in a dry tube using a sterile syringe after alcohol disinfection of an arm and sent to the laboratory for assays by the enzymatic method for urea and the assay by the kinetic colorimetric method for creatinine (using Chronolab® reactive). The urinary sample was taken following the blood sample using a dry sterile pot given to the patient, who was directed to the toilet and advised to collect about 30 mL of urine from the middle of the stream. The urine collected was immediately sent to the laboratory for qualitative and semi-quantitative protein analysis and Ph measurement on reactive urine strips. The following conditions were required before urinary sample

collection: no physical exertion 72 hours at the screen, no retraction of the foreskin in men without circumcision, and washing hands with clean water and soap.

Definitions

- Diabetes: the patient was declared diabetic according to the following criteria defined by the American Diabetes Association: a fasting plasma glucose (FPG) level ≥126 mg/dL (7.0 mmol/L) on two separate occasions, random blood glucose ≥200 mg/dL (11.1 mmol/L), 2 hours plasma glucose concentration ≥200 mg/dL (11.1 mmol/L) after 75 g anhydrous glucose in an oral glucose tolerance test (OGTT) (1). People with a previous diagnosis or treatment for diabetes were also considered for enrolment.
- Hypertension: systolic blood pressure (BP) ≥140 mmHg and/or diastolic BP ≥ defined hypertension. People with previous diagnosis or treatment for hypertension were also considered hypertensive.
- Obesity was defined as a body mass index (BMI) of ≥30 kg/m^2, and overweight was defined as a BMI between 25 and 29.9 kg/m^2.
- Sedentary lifestyle was defined as the absence of any physical activity (absence of at least three walking episodes of 45 min in a week).
- Waist circumference >94 cm in men or 80 cm in women was high.
- Excessive alcohol consumption was based on intake of either more than three (two for women) standard glasses of wine per day or more than ten (five for women) local beers per week. Traditional alcoholic beverage consumption was not assessed (19).
- Current smoking was defined as the consumption of at least one cigarette per day.
- A monthly income of less than 86.3 USD was defined as a low-social class. Other social classes were classified into the middle (by income between 86.3 and 258.9 USD) and the high (by an income above this amount).
- Glomerular filtration rate (GFR): it is estimated for this study, using CKD-Epidemiology Collaboration (CKD-EPI). It was automatically calculated using the MEDICALCUL® application using measured serum creatinine. Reduced estimated GFR (eGFR) was defined as clearance of creatinine (ClCr) <60 mL/min.
- Proteinuria was defined by the reactivity of the marker to the urine dipstick.
- Diabetic neuropathy was defined by the presence of any nerve damage related to diabetes.
- Diabetic retinopathy (DR) was defined by the presence of microaneurysms, retinal hemorrhage, cotton balls and/or exudates at the ophthalmological examination. The previous diagnosis of DR was also considered.
- CKD was defined by either a reduced eGFR and/or the presence of proteinuria at the urinary dipstick.

Sample size

The sample size was calculated using Lorenz's formula (Stat Calc of EPI Info Software). Using the national prevalence of 5.5% of diabetes mellitus in Cameroon and a 5% accepted margin of error, the minimal sample size estimate was 70 participants.

Statistical analysis

The data were recorded using Excel 2010 and analyzed using Epi info 3.5. The tables and figures were constructed in Microsoft Word Office and Excel 2019 software. The descriptive parameters used were: numbers and percentages. Quantitative variables were presented as mean ± standard deviation if the distribution follows a normal distribution, and as median [interquartile range (IQR)] if the distribution is skewed. Qualitative variables were expressed as absolute and relative frequencies. The results were presented in tables and graphs.

We subsequently looked for correlations between sociodemographic factors (age, sex, profession), socio-demographic data: age, profession, gender), clinical data on diabetes (diabetes duration, treatment, follow-up and known complications) and the either reduced eGFR and proteinuria. The degree of association between the variables was established by the χ^2 test and the threshold of significance was reached for a P value <0.05 and a confidence interval (CI) of 95%.

Ethical statement

The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the Regional Ethics committee of the west Region (Cameroon) (No. 932 of 18-03-2021) and informed consent was obtained from all individual participants.

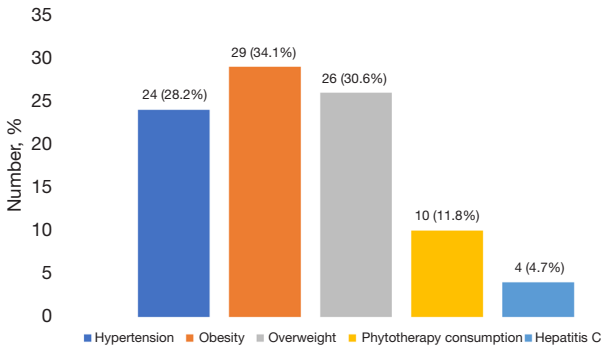

Figure 1 CKD risk factors among the population study. CKD, chronic kidney disease.

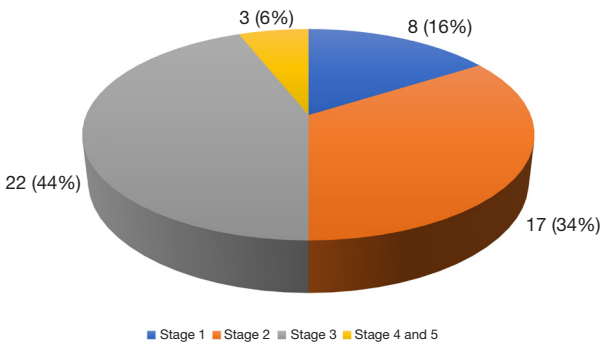

Figure 2 CKD classification among the population study. CKD, chronic kidney disease.

Results

Participants

A total of 85 participants (38 men) were selected with a median age of 61 (IQR, 49–69) years. People aged 60 and over accounted for more than half of the study population. Only 5 (5.9%) participants had a higher level of education, while the primary and secondary study levels were found respectively in 41 (48.2%) and 38 (44.7%) participants. Patients living with diabetes for less than 5 years were the most numerous, representing nearly half of the population (40 participants, 47.1%), followed by those living with diabetes for at least 10 years (24 participants, 28.2%). Hypertension was found in 24 (28.2%) participants while obesity, overweight, and phytotherapy consumption were respectively found in 29 (34.1%), 26 (30.6%) and 10 (11.8%) participants. Chronic hepatitis C infection was found in only four (4.7%) participants. *Figure 1* summarizes the risk factors of CKD among the study population. Reduction of eGFR was found in 25 (29.4%) of the participants, most common in patients living with diabetes aged 60 and over (P=0.003); while proteinuria was present in 37 (43.5%) of the patients. The median GFR was 77.74 (IQR, 56.1–92.3) mL/min/1.73 m^2.

Main data

We observed CKD among 50 (58.8%) participants. They have been classified according to KDIGO classification as follows: 8 (16%), 17 (34%), 22 (44%), 1 (2%) and 2 (4%) participants respectively in grade 1, 2, 3, 4 and 5 (*Figure 2*). The factors associated with the reduction of GFR in this population were hypertension [odds ratio (OR): 5.42, 95% CI: 1.92–15.3; P<0.001], consumption of nephrotoxic drugs (OR: 0.24; 95% CI: 0.09–0.67; P=0.003), duration of diabetes superior or equal to 10 years (OR: 3.14, 95% CI: 1.14–8.64; P=0.015) or less than 5 years (OR: 0.38; 95% CI: 0.15–1.02; P=0.029), the presence of a neuropathy (OR: 2.41; 95% CI: 0.83–8.52; P=0.048) and advanced age (OR: 4.14; 95% CI: 1.45–11.8; P=0.003) (*Table 1*). In multivariate analysis, hypertension [adjusted OR (aOR): 3.84; 95% CI: 1.9–15.3; P=0.017] was associated with eGFR reduction. DR (OR: 2.35; 95% CI: 0.87–6.32; P=0.048) was associated with the presence of proteinuria (*Table 2*). Only hypertension (aOR: 3.2; 95% CI: 1.15–8.16; P=0.04) was associated with CKD (*Table 3*).

Discussion

The purpose of our study was to determine the prevalence of CKD in the population of patients with diabetes followed at the DDH and to determine their risk factors. This study found a fairly high prevalence of CKD in these patients and allowed us to identify both the decrease in eGFR and the presence of proteinuria risk factors. These results should be integrated to the context of the COVID-19 pandemic where, with the difficulty to diagnose and manage COVID-19 cases, the fear of contamination only severe patients were brought to the hospital (20,21).

We recruited 85 participants (38 men). This female predominance is found in previous studies performed in Cameroon and could be explained by the proportion of the female gender in the Cameroonian population and by the much greater access to care for women (22,23). The median age in this population is 61 years. These data are superimposed to previous finding suggesting a higher

Table 1 Factors associated with reduced glomerular filtration in study population

Variables	GFR (mL/min/1.73 m^2)		OR	P value	aOR	aP value
	Reduced	Normal				
Gender						
Male	11 (44.0)	27 (45.0)	0.96	0.47	–	–
Female	14 (56.0)	33 (55.0)	1.04	Ref.	–	–
BMI						
Normal BMI	11 (44.0)	18 (30.0)	1.83	0.11	–	–
Overweight	8 (32.0)	19 (31.7)	1.01	0.48	–	–
Obesity	6 (24.0)	23 (38.3)	0.5	0.11	–	–
Hypertension	13 (52.0)	10 (16.7)	5.42	<0.001	3.84	0.017
Age						
≥60 years	19 (76.0)	26 (43.3)	4.14	0.003	2.89	0.07
<60 years	6 (24.0)	34 (56.7)	0.24	Ref.	–	–
Diabetes duration						
<5 years	8 (32.0)	33 (55.0)	0.38	0.029	–	–
5–9 years	6 (24.0)	15 (25.0)	0.95	0.47	–	–
≥10 years	11 (44.0)	12 (20.0)	3.14	0.015	1.94	0.26
Nephrotoxic drugs	7 (28.0)	37 (61.7)	0.24	0.003	–	–
Phytotherapy	2 (8.0)	8 (13.3)	0.56	0.39	–	–
Diabetic neuropathy	10 (40.0)	13 (21.7)	2.41	0.048	2.32	0.14
Diabetic retinopathy	8 (32.0)	14 (23.3)	1.54	0.21	–	–
Proteinuria	13 (52.0)	24 (40.0)	1.62	0.16	–	–

GFR, glomerular filtration rate; OR, odds ratio; aOR, adjusted OR; aP value, adjusted P value; CI, confidence interval.

prevalence of diabetes in people over the age of 55 (22,23). The majority of our patients worked in the informal sector. This would probably be explained by the low level of education (secondary and primary) limiting access to paid work. Participants with no income-generating activity were predominantly female explaining their main profession in this study (housewife).

We evaluated the GFR and the presence of proteinuria as markers of CKD among our participants. Proteinuria was found in 43.5% of our participants. This prevalence is close to 48.7% found by El Fadl *et al.* in the diabetology department in Fez but significantly higher than that (34.7%) previously found in urban areas of Yaounde, the city capital of Cameroon (16,24). However, these results are much lower than those found (62.5%) in a meta-analysis (22). This heterogeneity could be explained by the type of patients assessed (patients with multiple comorbidities or a long course of diabetes) and the dosage methods used. The GFR was estimated using the CKD EPI formula. Of our participants, 29.4% had a reduced eGFR. These findings were similar to those from Tanzania, where 24.7% of the participants were found to have a reduced eGFR (25). However, lower prevalences were respectively found in Ethiopia (19.4%) and Vietnam (7.5%) (26,27). This large disparity in prevalence could be related to the variability of the groups assessed and/or to the eGFR calculation methods used.

Based on the results of GFR and proteinuria, we obtained a 58.8% prevalence of CKD in our population. This result is comparable to that obtained by Marat Kofia Ibrahim *et al.* who found a prevalence of 59.6% in two peripheral urban centers in Cameroon (17). These results

Table 2 Factors associated with proteinuria in study population

Variables	Proteinuria		OR	95% CI	P value
	Present	Absent			
Gender					
Male	17 (45.9)	21 (43.8)	1.1	0.46–2.6	0.42
Female	20 (54.1)	27 (56.3)	0.9	0.38–2.17	Ref.
BMI					
Normal BMI	11 (29.7)	18 (37.5)	0.70	0.28–1.76	0.23
Overweight	13 (35.1)	14 (29.2)	1.31	0.52–3.29	0.28
Obesity	13 (35.1)	16 (33.3)	1.08	0.44–2.67	0.43
Hypertension	10 (27)	13 (27.1)	0.99	0.38–2.61	0.50
Age					
≥60 years	23 (62.2)	22 (45.8)	1.94	0.81–4.65	0.071
<60 years	14 (37.8)	26 (54.2)	0.51	0.21–1.23	Ref.
Diabetes duration					
<5 years	17 (45.9)	24 (50.0)	0.85	0.36–2.0	0.71
5–9 years	9 (24.3)	12 (25.0)	0.96	0.36–2.6	0.94
≥10 years	11 (29.7)	12 (25.0)	1.27	0.48–3.32	0.63
Nephrotoxic drugs	21 (56.8)	23 (47.9)	1.43	0.60–3.38	0.21
Phytotherapy	2 (5.4)	8 (16.7)	1.29	0.06–1.44	0.10
Diabetic neuropathy	13 (35.1)	10 (20.8)	2.05	0.78–5.43	0.076
Diabetic retinopathy	13 (35.1)	9 (18.8)	2.35	0.87–6.32	0.048
Reduced eGFR	13 (35.1)	12 (25.0)	1.62	0.63–4.16	0.16

OR, odds ratio; CI, confidence interval; BMI, body mass index; eGFR, estimated glomerular filtration rate.

are, however, much greater than those found by Choukem *et al.*, (31%) in the two major cities of Cameroon (28). This discrepancy can be explained by the evolution of this disease over 10 years (between both publications) and the lack of means for preventing or controlling the evolution of the disease in the peripheral urban centers. Similar to Bouzid *et al.* and Ajayi *et al.*, we had a predominance of participants with CKD stage 3 (29,30).

Factors associated with the reduction of estimated glomerular filtration flow were: high blood pressure, advanced age, consumption of nephrotoxic, the presence of neuropathy and diabetes duration. The presence of arterial hypertension, a recognized risk factor for kidney disease, is in line with the work of Choukem *et al.*, who found systolic blood pressure more than others (diastolic and pulsed) associated with the occurrence of CKD (14,15,17,28). Similarly, to our findings, Kaze *et al.* reported in 2015 and 2021, the highest consumption of street medication and herbal medicine in people with CKD (12,14). Understandably, the consumption of these nephrotoxic drugs has an impact on GFR. The association of the eGFR reduction with diabetes duration equal or greater than 10 years was proof of the long-term damage during diabetes. This finding was also observed in other epidemiological studies (26,27,31). All these results were similar to those of Bigna *et al.* and Tolossa *et al.*, who found high blood pressure, advanced age, obesity and long-term diabetes in a meta-analysis conducted in Africa (22,32).

The presence of retinopathy and a diabetes duration of fewer than 5 years was associated with proteinuria but had a protective effect. This was contrary to most data from epidemiological studies where retinopathy was associated

Table 3 Factors associated with CKD among patients with T2D

Variables	CKD		OR	P value	aOR	aP value
	Present	Absent				
Gender						
Male	23 (46.0)	15 (42.9)	1.1	0.47	–	–
Female	27 (54.0)	20 (57.1)	0.88	Ref	–	–
BMI						
Normal BMI	16 (32.0)	13 (37.1)	0.79	0.39	–	–
Overweight	17 (34.0)	10 (28.6)	1.29	0.30	–	–
Obesity	17 (34.0)	12 (34.3)	0.99	0.49	–	–
Hypertension	18 (36.0)	5 (14.3)	3.37	0.014	3.2	0.04
Age						
≥60 years	30 (60.0)	15 (42.9)	2.00	0.064	–	–
<60 years	20 (40.0)	20 (57.1)	0.50	Ref	–	–
Diabetes duration						
<5 years	22 (44.0)	19 (54.3)	0.66	0.18	–	–
5–9 years	12 (24.0)	9 (25.7)	0.9	0.43	–	–
≥10 years	16 (32.0)	7 (20.0)	1.88	0.11	–	–
Nephrotoxic drugs	23 (46.0)	21 (60.0)	0.57	0.10	–	–
Phytotherapy	4 (8.0)	6 (17.1)	0.42	0.11	–	–
Diabetic neuropathy	17 (34.0)	6 (17.1)	2.49	0.045	2.32	0.12
Diabetic retinopathy	15 (30.0)	7 (20.0)	0.71	0.16	–	–
Reduced eGFR	13 (26.0)	24 (68.6)	1.62	0.16	–	–

CKD, chronic kidney disease; T2D, type 2 diabetes; OR, odds ratio; aOR, adjusted OR; aP value, adjusted P value; BMI, body mass index; eGFR, estimated glomerular filtration rate.

with the presence of proteinuria (33,34). We found no association between the presence of proteinuria and the duration of diabetes evolution. Although it may seem paradoxical, this data is logical given that our population is essentially composed of type 2 diabetic patients and that in them renal complications may be present at diagnosis. Otherwise, nephrotoxic intake was not associated with proteinuria. We hypothesized that nephrotoxic drugs are responsible for interstitial or tubular lesions leading to urinary low protein excretion. These results are different from those of Bigna *et al.* who found proteinuria in patients with a diabetes course of more than 10 years and that about 35% of diabetics have this proteinuria in the end stage of renal failure (22).

In this study, hypertension was associated with CKD. This was similar to the findings from Choukem *et al.* and Kaze *et al.* (12,14,28). Although hypertension is known to be the main risk factor for CKD, its multiplicative effect (on the risk of CKD) in diabetic patients is debated (35). The high burden of hypertension in Cameroon and its high prevalence among this population are probably contributive to this status (23,36). There is a need to prevent hypertension occurrence among these patients and well control the disease.

We had several limits to this study. First, the number of participants because of the short recruitment time, we could only recruit 85 participants. Secondly, the health context of COVID-19: many follow-up patients were refractory to come to the hospital for fear of being infected with COVID-19. Despite the limited number of patients, the

high frequency of kidney damage in these patients with diabetes raises the alarm for urgent action to be taken to improve the quality of life of these patients. Thirdly, the lack of sufficient financial means to conduct more biological examinations (weighted dose of protein and creatinuria) and allow us to establish better correlations (especially with the glycemic control evaluated by the glycated hemoglobin assay). Thus, the involvement of the policymakers can make it possible to carry out large-scale studies.

Conclusions

The purpose of our study was to establish the prevalence of CKD in the population of patients with diabetes followed at the DDH and to determine their risk factors. CKD markers assessed in our study were the decrease in estimated glomerular filtration and the presence of proteinuria. Reduced eGFR was diagnosed in 29.4% of our population while proteinuria was found in 43.5%. The prevalence of CKD was therefore estimated at 58.8%. The risk factors associated with the decrease in eGFR were high blood pressure, advanced age, nephrotoxic consumption, neuropathy, and diabetes duration. The risk factors associated with the presence of proteinuria were the presence of retinopathy and diabetes duration.

Acknowledgments

We thank all the staff of the Dschang Regional Hospital Annex. We also thank Prof. François Jerome Kaze Folefack from the Faculty of Medicine and Biomedical Sciences (FMBS) of the University of Yaounde I and Medicine Unit of Yaounde Teaching Hospital (Cameroon) for his help in writing this manuscript.
Funding: None.

Footnote

Data Sharing Statement: Available at https://jxym.amegroups.com/article/view/10.21037/jxym-23-19/dss

Peer Review File: Available at https://jxym.amegroups.com/article/view/10.21037/jxym-23-19/prf

Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://jxym.amegroups.com/article/view/10.21037/jxym-23-19/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the Regional Ethics committee of the west Region (Cameroon) (No. 932 of 18-03-2021) and informed consent was obtained from all individual participants.

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doi: 10.21037/jxym-23-19
Cite this article as: Simeni Njonnou SR, Tchouamene LA, Kemta Lekpa F, Ngongang Ouankou C, Balti E, Ntsama Essomba MJ, Eyenga Bangbang CFG, Dongmo Demanou MC, Djeussi DE, Nguegoue Tchokouaha F, Zambou Ngoufack F. Prevalence and determinants of chronic kidney disease among patients with type 2 diabetes in a sub-Saharan resource-limited setting (case of Dschang District Hospital). J Xiangya Med 2024;9:1.