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Original Article

Modifiable and Non-Modifiable Factors Associated with Hyperuricemia in Patients Receiving Chronic Hemodialysis in Douala (Cameroon)

Facteurs modifiables et non modifiables associés à l'hyperuricémie chez l'hémodialysé chronique à Douala (Cameroun)

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ABSTRACT

Background. Hyperuricemia increases morbidity in end-stage chronic kidney disease (ESKD). The purpose of this study was to report its prevalence and associated factors in a population of sub-Saharan Africa adults with ESKD, the majority of whom receive two dialysis session per week. **Materials and methods.** We performed a prospective cross sectional study from January to April 2017 at the Hemodialysis Center of the Douala General Hospital (Cameroon). We recruited all consenting adults with ESKD who respect diet and lifestyle modifications. For each participant, we collected their sociodemographic and clinical data which were analyzed using the software SPSS 21.0. We made a multivariate analysis with logistic regression to assess the associated factors. The results were presented with the Odds ratio (OR) and its 95% Confidence interval. **Results.** A total of 180 participants (61.7% males) were recruited. The mean age was 49.5 ± 13.9 years and the main underline nephropathies were glomerular (33.9%) and vascular (30.6), with hypertension (91.1%), overweight (33.9%) and diabetes (23.9%) been the most frequent comorbidities. The prevalence of hyperuricemia was 81.7%. An age less than 50 years (OR=11.1 [2.8; 43.3]) was the only non-modifiable associated factors, while long interval between dialysis (OR=4.4 [1.5; 15.4]) and overweight (OR=4.5 [1.4; 14.7]) were the modifiable factors in our study/survey. **Conclusion**. To reduce the burden of hyperuricemia at ESKD, practicians have to reinforce therapeutic education for CKD, particularly for overweight patients and patients less than 50 years old, and improve the adhesion and compliance of patients to dialytic sessions.

RÉSUMÉ

Introduction. L'hyperuricémie augmente la morbidité de la Maladie Rénale Chronique Terminale (MRCT). Le but de cette étude était de déterminer la prévalence et les facteurs associés à l'hyperuricémie dans une population d'Afrique Subsaharienne avec MRCT, recevant deux séances d'hémodialyse par semaine. **Matériels et méthodes.** Nous avons réalisé une étude transversale prospective de janvier à avril 2017 auprès des patients adultes du centre d'hémodialyse de l'Hôpital Général de Douala (Cameroun). Nous avons recueilli leurs données sociodémographiques et cliniques qui ont été analysées à l'aide du logiciel SPSS 21.0. Nous avons effectué une analyse multivariée avec régression logistique pour évaluer les facteurs associés. Les résultats sont présentés avec l'Odds ratio (OR) et son intervalle de confiance à 95%. **Résultats.** Au total, 180 participants (61,7 % d'hommes) ont été recrutés. L'âge moyen était de 49,5 ± 13,9 ans et les principales néphropathies sous-jacentes étaient glomérulaires (33,9 %) et vasculaires (30,6). L'hypertension (91,1 %), le surpoids (33,9 %) et le diabète (23,9 %) étant les comorbidités les plus fréquentes. La prévalence de l'hyperuricémie était de 81,7 %. L'âge <50 ans (OR=11,1 [2,8 ; 43,3]) était le seul facteur non modifiable, alors qu'un long intervalle entre les dialyses (OR=4,4 [1,5 ; 15,4]) et le surpoids (OR=4,5 [1,4 ; 14,7]) étaient les facteurs modifiables. **Conclusion.** Pour limiter l'hyperuricémie en MRCT, les praticiens doivent renforcer l'éducation thérapeutique du patient, en particulier pour les patients en surpoids et les patients de moins de 50 ans, et améliorer l'adhésion et l'observance des patients aux séances de dialyse.

HIGHLIGHTS OF THE STUDY

What this study adds to our knowledge

- In a sample of 180 patients, the prevalence of hyperuricemia was 81.7%.
- The main underline nephropathies were glomerular (33.9%) and vascular (30.6), with hypertension (91.1%), overweight (33.9%) and diabetes (23.9%) been the most frequent comorbidities
- An age less than 50 years (OR=11.1 [2.8; 43.3]) was the only non-modifiable associated factors, while long interval between dialysis (OR=4.4 [1.5; 15.4]) and overweight (OR=4.5 [1.4; 14.7]) were the modifiable factors in our study/survey.

How this is relevant to practice, policy or further research.

The data will help to reduce the burden of hyperuricemia in patients with End Stage Kidney Disease.

BACKGROUND

The prevalence of Chronic Kidney Disease (CKD) is rising worldwide, affecting more than 200 million people [1,2]. Population of sub-Saharan Africa regions are 3 to 4 times more affected than those living in developed countries, with a rapid progression of the disease to the end stage, where the morbidity and mortality is high [3,4]. In Cameroon, about 13.2% of adults are suffering from CKD, but this prevalence is certainly underestimated [5]. Currents strategies need to be improved in order to prevent this affection, and control the progression of the disease for people who are affected in order to reduce the morbidity and mortality which is 8 times higher than in the general population [3,6].

Primarily excreted by the kidneys, serum uric acid level increase in case of CKD. This could lead to renal damages, gout, and cardiovascular complications [7–9]. Hyperuricemia has been identified as a risk factor for the development of CKD, but also worsens its prognosis. The prevalence of hyperuricemia is elevated among people living with CKD, especially at the End Stage Kidney Disease (ESKD) [10]. However, the development of hyperuricemia frequently precedes the onset of CKD [11]. This suggests the influence of other risk factors than renal impairment in the pathogenesis of hyperuricemia in this population.

Uric acid plays a central role in pathogenesis of gout and hyperuricemia [12]. Risk factor for developing gout can be classified as non-modifiable and modifiable; with non-modifiable factors being sex, age, race and genetics, and modifiable factors comprise diet and lifestyle [13]. Again, factors which promote hyperuricemia at ESKD can be classified into non-modifiable factors which cannot be changed when the disease is discovered, and modifiable factors which can be prevented and/or controlled in people affected by the disease.

The aim of this study was to identify the prevalence of hyperuricemia and these non-modifiable and modifiable factors associated with hyperuricemia in a population of sub-Saharan adults with ESKD. We believe, increasing knowledge on these factors will lead to preventive practices which could reduce both morbidity and mortality in patients with ESKD.

MATERIALS AND METHODS

Study design and setting

We carried out a prospective cross sectional study from January to April 2017, at the Douala General Hospital (DGH). DGH is a tertiary and referral hospital in the urban city of Douala and has the greatest HD center in Cameroon. The Nephrology Unit manages patients with renal diseases across the Littoral region in Cameroon. All the patients followed at the center generally have 2 dialysis sessions per week.

Participants

We recruited all consenting patients with CKD stage 5, undergoing HD and followed at the Nephrology Unit of DGH. CKD was diagnosed according to the Kidney Disease Improving Global Outcome 2012 (KDIGO 2012) [27]. We excluded patients who were on HD for less than 3 months, and those on UALT (Uric Acid Lowering Therapy).

Sample size estimation

The sample size was calculated in order to recruit at least 90% of the patients which were already followed in the hemodialysis unit by the end of the year 2016, i.e. 169 participants [15].

Ethical Considerations

Research authorizations were obtained from the administration of Douala General Hospital. Ethical clearance was obtained from the Institutional Ethical Review Board of the University of Douala, Cameroon, clearance n° CEI-UDO/937/16/2017/T. All the patients read and signed an informed consent sheet.

Data collection

Participants were approached on a random HD session. Data was collected through their record files, and we ran a clinical examination, followed by blood collection for biological analysis, all done before the dialysis. We collected informations on the age, gender, underlying nephropathy, comorbidities, residual diuresis (<100 ml/24 or ≥100 ml/24h), interval between the current and previous dialysis sessions, and relevant physical parameters (blood pressure, weight and height). Then, 2 mL of venous blood was collected before the dialysis session, through a peripheral vein.

Biological analysis

Collected blood samples were put in a dry and sterile labeled Vacutainer® tubes and centrifuged at 3000 rotations per minute for 5 minutes at 25° Celsius, and then, the serum collected was placed in dry type Eppendorf® tube. The collected serum was used to assess the SUA (Serum Uric Acid) levels by the enzymatic and colorimetric uricase method [16].

Operational terms

Hyperuricemia: was considered for uric acid level above 70 mg/L for men and 60 mg/L for women [12]. Non-modifiable factors were defined as factors which could not be changed when disease was discovered. This include:

age, sex and underline nephropathy. Modifiable factors were defined as factors which could be prevented and/or controlled in people affected by the disease. this include: comorbidities (diabetes, hypertension, weight excess, infections), interval between dialysis sessions and residual diuresis. Underline nephropathy was the primary kidney disease reported in the patient's chart. This could be hypertensive nephropathy, diabetic nephropathy, chronic glomerulonephritis, chronic interstitial nephritis, polycystic kidneys, hepatitis nephritis, gout nephropathy, focal and segmental hyalinosis or unknown. Hypertension, diabetes and past medical history of gout were considered when reported in patient's chart. Weight excess was defined as a BMI above 25 Kg/m².

Statistical analyzes

All the data collected were analyzed using the software SPSS 21.0. Quantitative variables were expressed in terms of mean and standard deviation (SD) while qualitative variables were expressed in terms of counts and proportions. Association between qualitative variables was searched with Pearson Chi-square test. The strength of associations was quantified with the Odds ratio (OR) and its 95% Confidence interval (95% CI). We used a multivariate analysis with binary logistic regression to eliminate confounding factors. The threshold of significance was set at 0.05.

RESULTS

Characteristics of the sample

Overall 180 patients (61.7% male) were included in the study. The mean age of participants was 49.5 ± 13.9 years. Underlying nephropathies included Glomerular nephropathy (33.9%), vascular nephropathy (30.6%) and mixed nephropathy (9.4%) were the main underlined nephropathy identified in the study sample. However, 32 (17.8%) participants had an undetermined nephropathy. Hypertension (91.1%), overweight (33.9%), and diabetes (23.9%) were the most frequent comorbidities found in this population. Cardiovascular complications affected one patients out of four (25%) and were dominated by Cardiopathies and cerebral stroke. Infectious diseases such as hepatitis B, C and HIV were found in one fifth of the cases. Among the study sample, the prevalence of hyperuricemia was 81.7% and only 10% of patients had a past history of gout. More than four patients out of five (82.2%) had passed more than 3 days between dialytic sessions and two-third of participants have less than 100mL/24h as residual dialysis (**Table I**).

Table I: characteristics of the sample.

Variables	Men	Women	Overall
N (%)	111 (61.7)	69 (38.3)	180 (100)
Mean age, year, (SD)	50.4 (13.5)	48 (14.7)	49.5 (13.9)
Age, min-max, year	22-80	15-74	15-80
Underlying nephropathy, n (%)			
Glomerular nephropathy	39 (21.7)	22 (12.2)	61 (33.9)
Vascular nephropathy	32 (17.8)	23 (12.8)	55 (30.6)
Undetermined nephropathy	16 (8.9)	16 (8.9)	32 (17.8)
Mixed nephropathy	15 (8.3)	2 (1.1)	17 (9.4)
Tubular and interstitial nephropathy	8 (4.4)	0 (0)	8 (4.4)
Hereditary nephropathy	1 (0.6)	6 (3.3)	7 (3.9)
Comorbidities, n (%)			
Hypertension	104 (57.8)	60 (33.3)	164 (91.1)
Weight excess	36 (20)	25 (13.9)	61 (33.9)
Diabetes	30 (16.7)	13 (7.2)	43 (23.9)
Heart diseases	20 (11.1)	9 (5)	29 (16.1)
Cerebral stroke	11 (6.1)	5 (2.8)	16 (8.9)
Hepatitis C	13 (7.2)	7 (3.9)	20 (11.1)
HIV	4 (2.2)	7 (3.9)	11 (6.1)
Hepatitis B	5 (2.8)	0 (0)	5 (2.8)
Hyperuricemia	84 (46.7)	63 (35)	147 (81.7)
Past history of gout	15 (8.3)	3 (1.7)	18 (10)
Tobacco consumption	4 (2.2)	1 (0.6)	5 (2.8)
Cancer	0 (0)	1 (0.6)	1 (0.6)
Interval between dialytic sessions			
<3 days	21 (11.7)	11 (6.1)	32 (17.8)
≥3 days	90 (50)	58 (32.2)	148 (82.2)
Residual diuresis			
<100mL/24h	75 (41.7)	37 (20.6)	112 (62.2)
>100mL/24h	36 (20)	32 (17.8)	68 (37.8)

Non-modifiable and modifiable factors associated to hyperuricemia

Within the non-modifiable factors searched for in this study, only age, sex and mixed underlined nephropathy were found to be significantly associated to hyperuricemia (**Table II**).

Table II: Non-modifiable factors associated to hyperuricemia among patients with ESKD (univariate analysis).

Variables	Hyperuricemia		*p*-value	OR [95% CI]
	Yes	No		
Age				
< 50 years	86 (47.8%)	4 (2.2%)	**<0,001**	**10.2 [3.4; 30.6]**
≥ 50 years	61 (33.9%)	29 (16.1%)		1
Sex				
Male	84 (46.7%)	27 (15%)	**0.008**	1
Female	63 (35%)	6 (3.3%)		**3.3 [1.3; 8.7]**
Underline nephropathy				
Vascular nephropathy				
No	100 (55.6%)	25 (13.9%)	0.38	1
Yes	47 (26.1%)	8 (4.4%)		1.4 [0.6; 3.5]
Glomerular nephropathy				
No	96 (53.3%)	23 (12.8%)	0.63	
Yes	51 (28.3%)	10 (5.6%)		1.2 [0.5; 2.7]
Tubulo-interstitial nephropathy				
No	140 (77.8%)	32 (17.8%)	0.66	1
Yes	7 (3.9%)	1 (0.6%)		1.6 [0.2; 13.4]
Mixed nephropathy				
No	137 (76.1%)	26 (14.4%)	**0.01**	**1**
Yes	7 (3.9%)	7 (3.9%)		**0.2 [0.09; 0.7]**
Undetermined nephropathy				
No	122 (67.8%)	26 (14.4%)	0.56	1
Yes	2((13.9%)	7 (3.9%)		0.7 [0.3; 1.9]
Hereditary nephropathy				
No	140 (77.8%)	33 (18.3%)	0.2	-
Yes	7 (3.9%)	0 (0%)		

Patients less than 50 years old were found to be 10.2 [3.4; 30.6] times more at risk than patients above 50 years, and females were also more at risk than males with an Odds ratio of 3.3 [1.3; 8.7]. apart from all etiologies of nephropathy, only mixed nephropathy was significantly associated with the onset of hyperuricemia with a reduced risk (OR=0.2 [0.09; 0.7]. In the study sample, we found a long interval (more than 3 days) between dialytic sessions to be a modifiable factor which significantly increased the risk of hyperuricemia of 2.6 [1.5; 8.5] fold rather than patients with less than 3 days. Apart from this, patients with a Body Mass Index (BMI) more than 25 Kg/m² were also found to have an increased risk (OR=2.6 [1.04; 6.9]. Participants with diabetes, cardiopathies and cerebral stroke were found to have a reduced risk for developing hyperuricemia (**Table III**).

Table III: **Modifiable factors associated to hyperuricemia among patients with ESKD (univariate analysis).**

Variables	Hyperuricemia (N)		*p*-value	OR [95% CI]
	Yes (%)	No (%)		
Interval between dialysis				
<3 days	20 (11.1%)	12 (6.7%)	**0.002**	**1**
≥3 days	127 (70.5%)	21 (11.7%)		**3.6 [1.5; 8.5]**
Residual diuresis				
<100mL/24h	88 (48.9%)	24 (13.3%)	0.16	0.55 [0.2; 1.2]
>100mL/24h	59 (32.8%)	9 (5%)		1
Comorbidities				
Hypertension				
No	13 (7.2%)	3 (1.7%)	0.9	1
Yes	134 (74.4%)	30 (16.7%)		1.03 [0.2; 3.8]
Diabetes				
No	120 (66.7%)	17 (9.4%)	**<0.001**	**1**
Yes	27 (15%)	16 (8.9%)		**0.2 [0.1; 0.5]**

Table III: Modifiable factors associated to hyperuricemia among patients with ESKD (univariate analysis).				
Body Mass index				
<25 Kg/m²	55 (30.6%)	6 (3.3%)	**0.03**	**1**
>25 Kg/m²	92 (51.1%)	27 (15%)		**2.6 [1.04; 6.9]**
Past history of gout				
No	135 (75%)	27 (15%)	0.08	1
Yes	12 (6.7%)	6 (3.3%)		0.4 [0.13; 1.1]
Cardiopathies				
No	128 (71.1%)	23 (12.8%)	**0.01**	**1**
Yes	19 (10.6%)	10 (5.6%)		**0.3 [0.1; 0.8]**
HIV				
No	136 (75.6%)	33 (18.3%)	0.1	-
Yes	11 (6.1%)	0 (0%)		
Cerebral stroke				
No	137 (76.1%)	27 (15%)	**0.03**	
Yes	10 (5.6%)	6 (3.3%)		**0.3 [0.1; 0.9]**
Hepatitis B				
No	144 (80%)	31 (17.2%)	0.2	
Yes	3 (1.7%)	2 (1.1%)		0.3 [0.05; 2.01]
Hepatitis C				
No	131 (72.8%)	29 (16.1%)	0.8	
Yes	16 (8.9%)	4 (2.2%)		0.8 [0.2; 2.8]
Tobacco consumption				
No	142 (78.9%)	33 (18.3%)	0.28	-
Yes	5 (2.8%)	0 (0%)		

All the variables with a p-value less than 0.2 were used for multivariate analysis with logistic regression to eliminate confounding factors. At the end, only the age less than 50 years (p=0.001), an interval between dialysis more than 3 days (p<0.01), and a BMI over 25 kg/m² (p=0.01) remain significantly associated to hyperuricemia at ESKD (**Table IV**).

Table IV: Multivariate analysis with logistic regression to identified independent factors associated to hyperuricemia among patients at ESKD.

Variable	Univariate analysis		Multivariate analysis	
	p value	**OR [95% CI]**	**p value**	**OR [95% CI]**
Sex (Female)	**0.008**	**3.3 [1.3; 8.7]**	0.1	0.4 [0.1; 1.3]
Age (<50 years)	**<0,001**	**10.2 [3.4; 30.6]**	**0,001**	**11.1 [2.8; 43.3]**
Mixed nephropathy	**0.01**	**0.2 [0.09; 0.7]**	0.9	0.9 [0.2; 4.5]
Interval between dialysis (≥3 days)	**0.002**	**3.6 [1.5; 8.5]**	**0.006**	**4.4 [1.5; 15.4]**
Residual diuresis (<100mL/24h)	0.16	0.55 [0.2; 1.2]	0.86	0.9 [0.3; 2.6]
Diabetes	**<0,001**	**0.2 [0.1; 0.5]**	0.1	2.3[0.8; 6.7]
Weight excess	**0.03**	**2.6 [1.04; 6.9]**	**0.01**	**4.5 [1.4; 14.7]**
Past history of gout	0.08	0.4 [0.13; 1.1]	0.3	2.1 [0.4; 10.6]
Cardiopathy	**0.01**	**0.3 [0.1; 0.8]**	0.18	2.2 [0.6; 7.1]
Cerebral stroke	**0.03**	**0.3 [0.1; 0.9]**	0.6	1.4 [0.3; 6.5]
Hepatitis B	0.2	0.3 [0.05; 2.01]	0.07	8.5 [0.7; 142]

OR: Odds ratio

DISCUSSION

Primary excreted by the kidney, uric acid level depends on renal function. In people with impaired renal activity, uricemia could increase and possibly affects kidney's health and lead to other complications such as gout and cardiovascular disease. At the ESKD, the prevalence of hyperuricemia is high, this is associated to an elevated risk of advert cardiovascular events in this population which already have a great mortality. In the need to fight against this potential killer, this study aimed to determine modifiable and non-modifiable associated factors which promotes hyperuricemia among a sub-Saharan African group of adults with ESKD, with the purpose that the identification of these factors will lead to update the strategy to fight against CKD mortality.

Kidneys excretion of urates account for approximately 70%, and, from the amount of uric acid which pass through the glomeruli, 5-10% is excreted and 90% is reabsorbed mainly at the proximal tubule [17]. Therefore, the development of hyperuricemia negatively impacts the glomerular filtration rate. Hyperuricemia has been reported in approximately 40% to 60% of patients with CKD stages 1 to 3, and 70% of patients with CKD stage 4 or 5, which is an elevated prevalence [17,18]. This proportion is close to those of ours representing only the stage 5 of the disease. Hyperuricemia could be primary or

secondary. Primary due to an impaired uric acid production and secondary mainly due to a decrease in excretion [12]. The decrease in uric acid filtration apart from GFR abnormalities, could be increased with the use of drug modifying uric acid metabolism such as diuretics which were excluded from our study sample [17]. Once present, hyperuricemia could have worse effects on the pathophysiology of CKD and associated diseases. In fact, it has been associated to the pathogenesis of type II diabetes, the onset and aggravation of diabetic nephropathy and other microvascular complications of diabetes [7,18,19]. Hyperuricemia favors an impaired glucose metabolism by inhibiting pancreatic beta cells function, and impact on insulin metabolic signal in kidney tubules [17,20]. This results on hyperinsulinemia and insulin resistance, and increases the risk for diabetic nephropathy and its progression [9,18]. Apart from this, uric acid has been incriminated in the pathogenesis and predisposition to hypertension [21]. Its causes inflammation and oxidative stress with endothelial dysfunction [17,22–25] which leads to lipid damage and are strong risk factors for cardiovascular events, the major causes of death of patients with ESKD [6]. Therefore, increased uric acid level on blood correlates and predict the cardiovascular mortality in hemodialysis patients [17]. Uric acid can cause further damage with the depositions of urate crystals in kidney tubule, valvular and vascular calcifications explaining why 10% to 20% of people with untreated and symptomatic hyperuricemia will developed ESKD [7,17,20,26].

Hyperuricemia is the basis of the pathogenesis of gout. Its share the same risk factors. Classical risk factors of gout are classified as non-modifiable factors including the age, sex, and genetics, and modifiable factors including diet and lifestyle [13]. Apart from them, gout has many associated factors like components of metabolic syndrome [27], which could be considered as modifiable associated factors similar to those of cardiovascular diseases. For patients with ESKD, factors which could impacts on uric acid metabolism could be classified as modifiable and non-modifiable. The non-modifiable associated factors include age, sex, genetics and the underlying cause of nephropathy which could not be changed after the onset of the disease. Modifiable associated factors could include diet, lifestyle, comorbidities and dialysis parameters, which are factors which could be prevented or controlled at the ESKD. In this study, we did not focus on genetics factors and diet. Included participants were followed-up regularly at the center and they had to respect the diet recommendations prescribed for CKD which did not favor hyperuricemia [14]. Also, it may be difficult to evaluate the potential hyperuricemic effect of a traditional meal but we assume that participants recruited in the same locality are exposed to the same type of nutrition. We found that an age less than 50 years, more than 3 days between dialytic sessions and overweight are significantly associated factor to hyperuricemia among adults with ESKD in our population.

Age is known as a classical risk factor for hyperuricemia and gout. Uric acid level in blood rising with age and gout is known as the most frequent cause of arthritis after 40 years [12,13]. However, patients with less than 50 years were 11.1 times more at risk than elderly adults of our study. In fact, the frequency of acute and chronic complications related to hypertension, diabetes and CKD with a high prevalence in our population were strongly related to age. The onset of complications more frequent in elderly reinforces the adhesion of patients to dietetic measures and could explain why they were less at risk for hyperuricemia than the youngest. Men were relatively more exposed than women to hyperuricemia and gout, due to the protective effect of estrogen before menopause [13]. Although women seem less affected by hyperuricemia than men in our study (ORa=0.4), this was not statistically significant probably because of our sample which was made up of elderly women as much as younger; elderly women, mostly menopause are at same risk than male to develop gout and have more comorbidities like component of metabolic syndrome [28]. Diabetic nephropathy is the most likely nephropathy to be associated to hyperuricemia in CKD because of its role in the onset of diabetes, the initiation of microangiopathy and progression of nephropathy to the end stage [29]. However, this association was not found in our sample. Most of the patients with CKD in our context were discovered at stage 3 to 5, at this stage, it is sometimes difficult to affirm the date of onset of comorbidities and their participation in the pathogenesis of the underlying nephropathy [5]. Hyperuricemia is a component of metabolic syndrome, and is also strongly associated to the other component, especially elevated blood pressure, impaired glucose metabolism and weight excess [12,27,30]. We identified overweight as a strong associated factor to hyperuricemia among patients with CKD. It is also a risk factor and progression factor of CKD [31]. Weight loss measures should be reinforce in this population to limits its action, especially for cardiovascular diseases [25,32,33]. With the impaired renal function at ESKD, dialysis is one of the methods to eliminate blood uric acid excess. However, due to financial and technical issues, the recommended numbers of dialytic sessions per week (3) is not adequate in sub-Saharan Africa [3,34,35]. We found out that a long interval between dialysis (≥3 days) is associated to 4.4 elevated risk of hyperuricemia at ESKD. This finding raised the importance of adequate number of hemodialytic sessions per week to effectively eliminates uric acid from excess.

The interpretation of the data from our study must, however, take into account certain limitations, such as the small sample size, the performance of a single uricemia determination, given that the latter may vary over time.

CONCLUSION

Keeping in mind the limitations of our results, we can conclude that hyperuricemia at ESKD concern 3 patients out of 4. Long interval between dialytic sessions and overweight are significant modifiable associated factors and then, practicians should focus on them, on the prevention and management of hyperuricemia in this population, to reduce its associated morbidity and mortality.

DECLARATIONS

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Ethical approval and consent to participate

Research authorisations were obtained from the administration of Douala General Hospital. Ethical clearance was obtained from the Institutional Ethical Review Board of the University of Douala, Cameroon, clearance n° CEI-UDO/937/16/2017/T. All methods were performed in accordance with the relevant guidelines and regulations. All the patients read and signed an informed consent sheet.

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Availability of data and materials

The datasets generated and/or analysed during the current study are available from the corresponding author on request.

Consent for publication

Not applicable.

Contribution of authors

MSD and MPH designed the study; AIA collected and analyzed data. JRN, ME and JBL built the manuscript; GA revised the manuscript; All the study was done under the supervision of MSD. All authors read and approved the final manuscript.

Competing interest

The authors declare there is no competing interest.

Abbreviations

BMI: Body Mass Index; CKD: Chronic Kidney Disease; DGH: Douala General Hospital; ESKD: End Stage Kidney Disease; HD: Hemodialysis; SUA: Serum uric acid; UALT: Uric Acid Lowering Therapy.

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