



Original Article

Clinical Spectrum and Outcome of Renal and Urinary Tract Disease among Medical Admissions at the Bamenda Regional Hospital-Cameroon: A 2-Years Review

Spectre clinique et devenir des maladies rénales et des voies urinaires parmi les admissions en médecine interne à l'Hôpital Régional de Bamenda : étude sur 2 ans.

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ABSTRACT

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Background. Without a national renal registry in Cameroon, the burden and forms of renal disease in the North-West region of Cameroon is unknown. We aimed to describe the clinical pattern and outcome of renal and urinary tract admissions in the medical wards of the Bamenda Regional Hospital (BRH). **Materials and methods.** This was a retrospective analysis of records of patients hospitalized between January 1st, 2017 and December 31st, 2018, in the medical wards of the BRH. We excluded patients with incomplete files. **Results.** Out of the 2079 admissions, 274(13.2%) had renal and urinary tract disorders. In all, 75.5% (n= 207) were emergency admissions, 30.3% were referrals, with 92.7% (n=76) referred by general practitioners. Non-dialysed chronic kidney disease (CKD-ND) (40.9%), acute kidney injury (AKI) (27.4%), urinary tract infection (14.6%), dialysed chronic kidney disease (12.8%), nephrotic syndrome (2.2%) and renal colic (2.2%) were the renal syndromes seen. The need for dialysis was 57.3% in the AKI group and 67.8 % in the CKD-ND group, with less than 60% access rate. The overall mortality was 15.3% and the median length of hospital stay was 10 [IQR: 7 – 15] days. **Conclusion.** Renal and urinary tract diseases constitute a significant health burden in our community. The clinical pattern is dominated by CKD-ND and AKI secondary to preventable causes. Access to dialysis remains poor in those in need.

RÉSUMÉ

Introduction. En l'absence d'un registre national camerounais sur les maladies rénales, le fardeau que représente les maladies de l'appareil urinaire ainsi que leurs différentes présentations sur la population du Nord-Ouest Cameroun reste inconnue. Le but de notre travail était de décrire les différents aspects cliniques ainsi que le devenir de ces maladies parmi les admissions en médecine interne à l'Hôpital Régional de Bamenda. **Matériels et Méthodes.** Il s'agissait d'une analyse rétrospective des dossiers des patients hospitalisés entre le 1^{er} janvier 2017 et le 31 décembre 2018, dans les services de médecine interne de l'Hôpital Régional de Bamenda. Nous avons exclu les patients dont les dossiers étaient incomplets. **Résultats.** Sur les 2079 admissions durant la période d'étude, 274 (13,2 %) présentaient des maladies rénales et des voies urinaires. Au total, 75,5% (n=207) de ces admissions rénales étaient des admissions d'urgence, 30,3% étaient des références avec 92,7% (n=76) d'elles réalisées par des médecins généralistes. Les maladies rénales chroniques non dialysées (MRC-ND) (40,9 %), les lésions rénales aiguës (LRA) (27,4 %), les infections des voies urinaires (14,6 %), les maladies rénales chroniques en dialyse (12,8 %), le syndrome néphrotique (2,2 %) et la colique néphrétique (2,2 %) étaient les syndromes rénaux observés. Le besoin de dialyse était de 57,3 % dans le groupe avec LRA et de 67,8 % dans le groupe MRC-ND, avec un taux d'accès inférieur à 60 %. La mortalité globale était de 15,3 % et la durée médiane d'hospitalisation était de 10 [EIQ : 7 – 15] jours. **Conclusion.** Les maladies rénales et des voies urinaires sont fréquentes en hospitalisation dans notre communauté. Leur présentation clinique est dominée par les MRC-ND et les LRA dues à des causes évitables. L'accès à la dialyse reste limité chez les personnes dans le besoin.

INTRODUCTION

Kidney disease is a growing worldwide public health problem. In advanced cases, it is associated with a high cost of care, high mortality and poor quality of life(1).

Its spectrum differs in prevalence, natural course and/or outcome from one region to another and many studies have focused essentially on acute kidney injury (AKI)

and chronic kidney disease (CKD)(2,3). About 13 million people suffer from AKI annually with 85% occurring in low-income countries; 20% of hospitalized adult patients worldwide experience AKI and 1.7 million die annually from AKI with over 85% of deaths occurring in sub-Saharan Africa(4,5). In hospitalized patients, AKI increases the length of hospital stay by 5.7 days, the cost of care by 2 to 3 fold, rise in-hospital mortality by 10 fold, and a greater 2 to 3 fold risk of readmission (6,7). CKD on the other hand affects one in every 10 adults and 10% to 14.2% of adult Cameroonians(8). And in a more severe form where dialysis is required for survival, mortality rates are high and quality of life is poor. Its treatment is associated with catastrophic expenditure in low-income countries(9).

In sub-Saharan Africa, the prevalence of renal disease among hospitalized populations varies between 2 to 18.2%(10–13). However, these results are derived mainly from studies conducted in nephrology wards of tertiary hospitals and sometimes are based solely on a specific clinical renal entity.

In Cameroon, kidney disease is a growing public health problem. A single-centre study in the nephrology ward of a tertiary hospital in the country found CKD, AKI, and nephrotic syndrome to be the main clinical entities. However, apart from the level of the hospital, the study excluded patients on maintenance haemodialysis and did not report on patient outcomes. We therefore sought to describe the clinical pattern and outcome of these diseases among medical admissions in a second level reference health institution.

METHODS

Study design and setting

This was a 2-years retrospective analysis of medical records of patients admitted from January 1st, 2017 to December 31st, 2018 in the medical wards of the Bamenda Regional Hospital (BRH). Bamenda is the capital city of the North-West Region (NWR) of Cameroon - Sub-Saharan Africa. The BRH is a 2nd level reference health institution with a catchment population of over 2 million inhabitants. It is a 400-bed capacity hospital, which serves as a teaching hospital for medical students and nurses in the town. It has an outpatient department, imagery, laboratory, emergency unit and inpatient services (intensive care unit, medical, surgical, paediatric and gynaecology and obstetrics unit department) with specialist in internal medicine, nephrology, gynaecology and obstetrics, general surgery and neurosurgery. It has a haemodialysis centre with eight generators of the Fresenius® 4008S dialysis technology (Fresenius Medical Care, Homburg, Germany).

Study participants and procedure

We included all patients ≥ 18 years old admitted into the medical units during the study period. We excluded patients with no precise diagnosis nor outcome information. We used the in-patient/discharge register of

the medical wards to identify participants of interest and retrieve their medical records. The institutional Ethics review board of the University of Bamenda approved the study with reference number 2019/0005H/UBa/IRB

Variables

Patient's information recorded included sociodemographic characteristics, type of admission (emergency or elective), source of referral, comorbidities, type of renal disease, severity, aetiology and outcome. Renal outcomes of interest were the need and access to dialysis and vital outcomes being dead or alive. A nephrologist made the clinical diagnosis of renal and urinary tract disease.

Definitions of terms

CKD was defined as kidney damage for ≥ 3 months and/or glomerular filtration rate (GFR) < 60 ml/min per 1.73 m^2 for ≥ 3 months with or without kidney damage. AKI was defined as a rise or decrease in serum creatinine of at least 0.3 mg/dl within 48h or an increase or decrease in serum creatinine to more than 1.5 times of baseline which is known or presumed to have occurred within the prior 7 days. Nephrotic syndrome was defined as the association of proteinuria >3 g/24 hours, hypoalbuminemia < 3.0 g/dl and edema. Chronic glomerulonephritis referred to CKD with hypertension, proteinuria or haematuria, and small sized kidneys on ultrasonography while chronic interstitial nephritis referred to CKD with low grade of proteinuria (less than 2+) without hypertension and haematuria. Hypertension was defined as systolic blood pressure (SBP) ≥ 140 mmHg and/or diastolic blood pressure (DBP) ≥ 90 mmHg or use of blood pressure-lowering medications. Diabetes mellitus was defined as fasting capillary glucose ≥ 126 mg/dl or use of glucose-lowering medications. Emergency admission was defined as any admission requiring immediate medical intervention as the result of severe, life threatening or potentially disabilities conditions and elective admission was defined as others admissions which were not fulfil the criteria of emergency admission. The need for dialysis was defined as prescribed dialysis by the nephrologist, and dialysis access as those with indications for dialysis who were dialyzed.

Statistical analysis

Data was entered into Census Survey Processus (CSPro version 7.2) system and exported to the Statistical Package for Social Sciences (SPSS) version 23.0 software for statistical analysis. We report continuous variables as means (SD) or median (IQR) where appropriate, and discrete variables as frequencies and percentages. A p-value of < 0.05 was considered statistically significant.

Ethical statement

The ethical committee of the faculty of the University of Bamenda approved this work with reference number 2019/0005H/UBa/IRB. We carried out this work according to the declarations of Helsinki. We report this work according to the STROBE checklist.

RESULTS

A total of 2327 patient records were reviewed, and 248 incomplete files were excluded. A total of 2079 participants (1173 men and 906 females) were therefore included.

Renal and urinary tract (RUT) diseases represented 13.2% (274/2079) of medical admissions, leading to the fourth cause of admissions after non-renal infectious diseases (40.0%), cardiovascular diseases (23.6%) and digestive diseases (15.0%). The median age of patients with RUT diseases was 51 [IQR: 34.75-65] years (range: 18 -108 years). In all, 75.5% (n= 207) of RUT were emergency admissions. Eighty-three (30.3%) were referrals with 42.9% from out of the region. Most of the patients were referred by general practitioners (92.7%; n=76) essentially from first and second level health institutions (See table I). In all, 69.3% (n=190) had at least one comorbidity with hypertension (78.4%; n=149), diabetes (40.5%; n=77) and HIV/AIDS (22.1%; n=42) being most common (See table II).

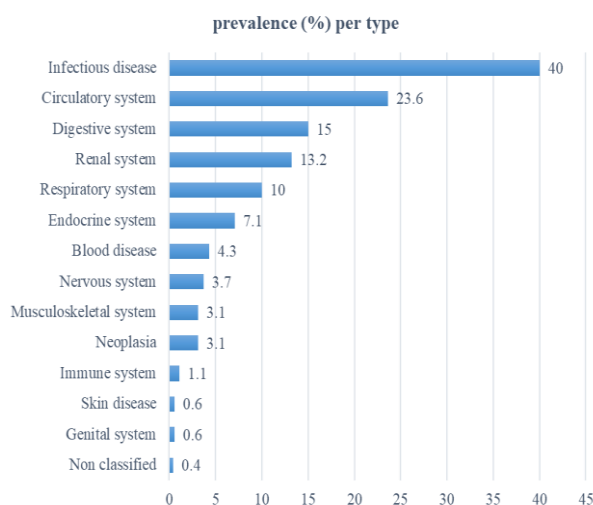


Figure 1: Representation pattern of disease according systemic classification (N=2079)

Table I: Sociodemographic characteristics, mode of admission and referral of participants with renal disease (N=274)

Variable	Total (N=274) n (%)	Male (N=147) n (%)	Female (N=127) n (%)	p-value
Age in years*	51 [34.75-65]	52 [38-65]	48 [29-65]	0.196
Residence				
Urban	151 (55.1)	77 (52.4)	74 (58.3)	0.329
Rural	123 (44.9)	70 (47.6)	53 (41.7)	
Admission type				
Emergency	207 (75.5)	117 (79.6)	90 (70.9)	0.094
Elective	67 (24.5)	30 (20.4)	37 (29.1)	
Referred (N=83)	83 (30.3)	50 (34.0)	33 (26.0)	0.149
Source of referral				
North-West region	47 (57.1)	26 (52.0)	21 (63.6)	0.563
Out of region	36 (42.9)	24 (48.0)	12 (35.4)	
Referring hospital				
1 st level	76 (91.6)	44 (88.0)	32 (97.0)	0.383
2 nd level	5 (6.0)	5 (10)	0 (0.0)	0.064
3 rd level	2 (2.4)	1 (2.0)	1 (3.0)	1
Referent profile				
General practitioner	76 (92.7)	45 (90.0)	31 (96.9)	0.253
Nephrologist	6 (6.1)	4 (8.0)	2 (3.1)	0.377
General surgeon	1 (1.2)	1 (2.0)	0 (0.0)	1
Nurse	1 (1.2)	0 (0.0)	1 (3.0)	0.464

*median [Interquartile range]

The clinical spectrum of RUT diseases were non-dialysed chronic kidney disease (CKD-ND) (40.9%; n=112), acute kidney injury (AKI) (27.4%; n=75), urinary tract infection (14.6%; n=40), dialysed chronic kidney disease (12.8%; n=35), nephrotic syndrome (2.2%; n=6), and renal colic (2.2%; n=6). The main aetiologies of CKD-ND were hypertensive nephropathy (29.5%; n= 33), chronic interstitial nephritis (20.5%; n= 23), chronic glomerulonephritis (18.8%; n= 21) and diabetic nephropathy (13.4%; n= 15). The severity, reason for admission, aetiologies and causes of CKD-ND are outlined in Table III. In the AKI group, 60% were in KDIGO stage 3 and renal parenchymal diseases were dominated by acute tubular necrosis (53.3%; n=40). The clinical characteristics of patients with AKI

are outlined in Table IV. For the dialysis CKD group, over 50% were using a temporary central venous catheter and the reasons for admission were severe anaemia (48.6%; n=17), volume overload (25.7%; n=9) and catheter-related-sepsis (22.9%; n=8) (see Table V). Two patients with the nephrotic syndrome had Loa loa microfilariae and hepatitis B infections respectively.

Of the 75 patients with AKI, 43 (57.3%) had at least one indication for dialysis, but 10 (23.3%) could not access it; whereas 76 (67.8%) patients with stage 5 CKD-ND had an absolute indication for initiation of dialysis with only 37 (48.7%) having access (see Table VI).

Of the 274 patients, 208 (76.0%) were discharged following clinical improvement, 38 (13.9%) died during

hospital admission, 25 (9.1%) left hospital against medical advice, and 3 patients (1.2%) were referred to other health facilities (2 cases of CKD-ND for family convenience, and a patient with renal colic for ureterolithotomy) (see Table VII). The overall mortality rate was 15.3% (38/248) with the highest mortality seen among patients with CKD-ND (18.9%; n=18). The median duration of hospital stay was 10 [IQR: 7-15] days with the highest median hospital stay observed in patients with the nephrotic syndrome [20 (IQR: 17-23) days]. Patients with RUT disease had a significantly longer hospital stay compared to patients with non-RUT disease [10 (IQR: 7-15)

Table II: Distribution of comorbidities in participants with renal disease and at least one comorbidity (N= 190)

Variable	Category	Frequency	Percentage
	Hypertension	149	78.4
	Diabetes mellitus	77	40.5
	HIV/AIDS	42	22.1
	Tobacco	23	12.2
	Hepatitis B	6	3.1
	Obesity	5	2.6
	Hepatitis C	4	2.1

HIV/AIDS: Human Immunodeficiency Virus/ Acquired Immunodeficiency Syndrome;

The main aetiologies of CKD-ND were hypertensive nephropathy (29.5%, n= 33), chronic interstitial nephritis (20.5%, n= 23), chronic glomerulonephritis (18.8%, n= 21) and diabetic nephropathy (13.4%, n= 15). The severity, reason for admissions, aetiologies and causes of CKD-ND are outlined in Table 3.

Table III: Clinical characteristics of non-dialyzed chronic kidney disease (N=112)

Variable	Category	Frequency, n	Percentage (%)
CKD Severity	Stage 3a	1	0.9
	Stage 3b	10	8.9
	Stage 4	15	13.4
	Stage 5	86	76.8
Reason for admission	HTN emergency	49	43.8
	Severe uraemia	26	23.2
	Anaemia	23	20.5
	Diabetic coma	10	8.9
	CHF	10	8.9
Aetiology	severe sepsis	5	4.5
	HTN nephropathy	33	29.5
	Chronic interstitial nephritis	23	20.5
	Chronic glomerulonephritis	21	18.8
	Diabetic nephropathy	15	13.4
	Unknown	11	10.2
	HIV nephropathy	6	5.4
ADPKD	2	1.8	

HIV: Human Immunodeficiency Virus; ADPKD: autosomal dominant polycystic kidney disease; others: CHF: Congestive Heart failure

Table IV: Clinical characteristics of acute kidney injury (n=75)

Variable	Category	Frequency (n)	Percentage %
Severity of AKI	Stage 1	4	5.3
	Stage 2	26	34.7
	Stage 3	45	60.0
Aetiology			
Prerenal		9	12%
	Gastroenteritis	5	55.6
	Decompensated HF	4	44.4
Renal		53	70.7
	Infections	14	26.4
	Sepsis	8	16.1
	Malaria	6	11.3
	Nephrotoxins	26	49.1
	Drugs	11	20.8
	Herbal concoctions	9	17.0
Post renal	Pigments	4	7.5
	Media Contrast	1	1.9
	Food poisoning	1	1.9
Vascular		7	13.2
	Malignant HTN	7	13.2
Glomerular		6	11.3
	AGN	6	11.3
Post renal		13	17.3
	Prostate disease	6	46.2
	Pelvic mass	4	30.8
	Kidney stones	3	23.1

HTN: hypertension, AGN: acute glomerulonephritis, HF: heart failure

Table V: Clinical characteristics of hospitalized dialyzed chronic kidney disease (N=35)

Variable	Category	Frequency (n)	Percentage (%)
Comorbidities(n=31)			
	Hypertension	30	96.8
	Diabetes mellitus	9	29.0
	HIV	6	19.4
	Hepatitis C	1	3.2
	Tobacco	1	2.9
Reason for admission			
	Severe anaemia	17	48.6
	Volume overload	9	25.7
	Infections	8	22.9
	Catheter related	1	2.9
	Venous thrombosis		
	Others*	10	28.6
Dialysis vintage			
	>1 - 2 years	8	22.9
	2 - 5 years	22	62.8
	> 5 years	5	14.3
Vascular access type			
	Temporal CVC	18	51.4
	Arteriovenous fistula	13	37.1
	Permanent CVC	4	11.4

CVC: central venous catheters, *others: hypertensive emergency (n=4), severe malaria (n=2), reinitiation of dialysis, bleeding from cvc insertion site, spondylodiscitis and congestive heart failure]

Table VI: Need, access and reasons of non-access to dialysis (N=119)

	Need n (%)	Access n (%)	Reason for no access N (%)
AKI (N=75)	43 (57.3)	33 (76.7)	Lack of funds 8 (80.0) Refusal 2 (20.0)
CKD-ND (112)	76 (67.8)	37 (48.6)	Lack of funds 35 (89.7) Lack of material 3 (7.7) Refusal 1 (2.6)

AKI: acute kidney injury; CKD-ND: non-dialyzed Chronic Kidney Disease

Table VII: Outcomes of renal and urinary tract diseases (N=274)

	Dead	Discharge against medical advice	Transfer	Discharge on improvement
Overall	38	25	3	208
CKD-ND	18	17	02	75
AKI	13	3	0	59
Dialysed	4	3	0	28
Chronic Kidney Disease				
UTI	2	2	0	36
Nephrotic syndrome	1	0	0	5
renal colic	0	0	1	5

UTI: Urinary Tract Infection; CKD: Chronic Kidney Disease; AKI: Acute Kidney Injury; CKD-ND: non-dialyzed Chronic Kidney Disease.

DISCUSSION

This study has assessed the clinical pattern and outcome of renal and urinary tract medical conditions among medical admissions of the Bamenda regional hospital. We observed a diverse clinical spectrum of kidney and urinary tract diseases among medical admissions with a prevalence of 13.2%. CKD-ND (40.9%), AKI (27.4%), urine tract infection (14.6%), dialysed chronic kidney disease (12.8%), nephrotic syndrome (2.2%), and renal colic (2.2%) were the renal and urinary tract syndromes seen. Of the 187 patients with AKI and CKD-ND, 119(63.6%) needed dialysis, amongst whom 70(58.8%) accessed the therapy. The overall mortality rate was 15.3% and the median length of hospital stay was 10 [IQR: 7 – 15] days, significantly longer than for non-renal patients.

We found a high prevalence of RUT diseases (13.2%) which falls between the range (2% - 28.7%) reported in Nigeria(9,10,13). In our study, RUT admissions ranked fourth among medical admissions whereas in Nigeria, Ogunmola et al. (13) found them to be sixth in medical admissions. The level of awareness about the disease, availability of trained health personnel and the late diagnosis and inappropriate initial management are some of the contributory factors to this variance in prevalence. In our setting, over three-quarters (75.5%, n= 207) of

patients presented late in the course of their disease with complications requiring emergency admission.

The most common clinical syndromes were CKD-ND (40.9%) and AKI (27.4%), similar to the previous studies in Cameroon(14), Africa(2,12) and Nepal(15). The high burden of CKD-ND in this study population could be attributed to a combination of many factors. The silent and asymptomatic nature of the disease at early stage, high prevalence and severity of risk factors, late diagnosis and inappropriate management of these risk factors, less access to preventive care and the increased use of complementary and alternative medicine are some contributory factors(15–17).

The commonest aetiologies of CKD-ND were similar to previous studies in another region of the country(1,18,19) and in Nigeria(11), which were hypertensive nephropathy, chronic interstitial nephritis, chronic glomerulonephritis and diabetic nephropathy. However, we found chronic interstitial nephritis ranking above chronic glomerulonephritis and diabetic nephropathy. This apparent increase in chronic interstitial nephritis could be a result of the increasing use of nephrotoxic herbal agents in addition to indiscriminate over-the-counter drugs in our environment (20). Over 3 in 4 patients with CKD-ND were in KDIGO stage 5 on hospital presentation, most often with uremic symptoms requiring emergency dialysis. This characteristic probably reflects the late diagnosis and referral previously reported in sub-Saharan Africa (9,14,21–24). This late referral may be due to both late patient presentation, patient denial and primary physician-related factors (25).

Most of the patients with AKI, were in KDIGO stage 3 with renal parenchymal diseases (acute tubular necrosis (53.3%)) being most frequent. This is similar to a previous report in Yaounde(14). In contrast, a preponderance of pre-renal AKI was reported in tertiary hospital in the country (26) and in Mali (27). The preponderance of acute tubular necrosis in our setting reflects the late and longstanding evolution consequent on inadequate management of pre-renal AKI before referral. Nephrotoxins (49.1%) and infections (26.4%) were the two leading causes of AKI in our setting similar to the previous studies carried out in Cameroon(19,28) and SSA(3).

The need for dialysis was high (57.3% for AKI, and 67.8% for CKD-ND), probably linked to late presentation to the nephrologist mainly from late referrals, but also late health seeking behaviours as has been reported in previous SSA studies (12,14,29,30). The access rate to dialysis in this study was low (58.8%), similar to previous reports in the country and in SSA studies(29,31,32). Despite the availability of haemodialysis in the region and government subsidies, the out-of-pocket cost of haemodialysis remains exorbitant for many especially those living out of town. The overall mortality rate (15.3%) in this study was comparable to reports from some studies in Nigeria (10,11) but lower than another Nigerian report where the mortality was 32.2%(12). The mortality of the different syndrome recorded during in our study varied from 0 to

18.9% with highest rate seen among patients with CKD-ND, and the lowest in renal colic. The delay in management and non-access to dialysis were the frequent causes of mortality in CKD-ND (18.9%, n=18). Our AKI mortality rate (18.1%) was low compared to the previous studies in the country(26,29) and the pooled sub-Saharan African AKI study (30).

The median length of hospital stay was 10 (IQR: 7-15) days. This is similar to a mean of 12 ± 5 days in Nigeria (12) and higher than the 5.5 ± 3.5 days in Nepal (15). The severe renal impairment with complications observed in our patients, may contribute to the increased morbidity and therefore increased length of their hospital stay. The length of hospital stay was longest for nephrotic syndrome [20 (IQR: 17-23) days], probably due to a survival advantage.

CONCLUSION

This study reveals that renal and urinary tract diseases constitute a significant health burden in our community, affecting the young and associated with high mortality. The clinical pattern of these diseases is dominated by CKD-ND and AKI mostly seen at severe and late stages and mainly secondary to preventable causes. Access to dialysis remains poor in those in need.

STUDY LIMITATIONS

This study has some limitations. One limitation is that the study was carried out a single centre study in the region, so the results might not be generalizable to whole region and the country, highlighting the need for multicentric studies with a uniform protocol. Furthermore, in the absence of universal health coverage in our setting, only patients who could afford, were admitted into hospital causing a selection bias. However, to the best of our knowledge, this is the first study carried out at this level in the country, which provides a complete overview of the spectrum and outcome of kidney and urinary tract diseases.

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CONFLICT OF INTEREST

None to declare

AUTHORS' CONTRIBUTION

- **Conception:** Alex Tatang Mambap, Gloria E. Ashuntantang
- **Data collection:** Sylvie C. Ngum, Alex Tatang Mambap
- **Data analysis:** Sylvie C. Ngum, Alex Tatang Mambap, Denis G. Teuwafeu
- **Manuscript draft:** Alex Tatang Mambap, Denis G. Teuwafeu
- **Manuscript revision:** Gloria E. Ashuntantang
- **Supervision:** Gloria E. Ashuntantang

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