

Epidemiological Profile of Patients with Urolithiasis in Cameroon: Results of a Single-Center Study

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ABSTRACT

Background and Objectives: Urolithiasis, with a global prevalence of 1–20%, is an important healthcare problem affecting both adults and children. The incidence of urolithiasis has been rising in Sub-Saharan Africa due to dietary and lifestyle modifications. In Cameroon, there is a paucity of data concerning this condition. This study aimed to describe the epidemiological profile of patients presenting with urolithiasis in Cameroon.

Methodology: This was a 5-year retrospective study, involving the records of patients diagnosed with urolithiasis between January 2017 and December 2022. It was carried out at a specialist urologic centre in Douala. Data were analyzed using Statistical Package for Social Sciences (SPSS) version 23.0.

Results: The mean age of the patients with urolithiasis was 43.4 ± 13.5 years. The prevalence of urolithiasis was 4.9%, and the age group with the highest disease burden was 40–60 years (153 (42.9%)). Urinary stones were observed more in men (236 (66.1%)), in patients who drank less than 1 litre of water per day (340 (95.8%)), in patients living in urban areas (339 (95.0%)), and in patients with a BMI between 25.0 kg/m² and 29.9 kg/m² (98 (40.5%)). Colicky abdominal pain was the most common presenting complaint observed in 93% (n = 332) of patients. Stones were found on the right side in 44.3% (n = 158) of the cases, and the most common locations were the kidney (202 (56.6%)) and the ureter (102 (28.6%)).

Conclusion: Urolithiasis is common in Cameroon, with a prevalence within the global prevalence range. It occurs more in males, and the highest prevalence is in the 40–60 age group.

Keywords

Urolithiasis, Epidemiological profile, Frequency, Lifestyle.

Introduction

Urinary Stone Disease (USD) is the third most common affliction of the urinary tract after urinary tract infections and pathologic conditions of the prostate [1]. It has gained increasing significance

due to its rising worldwide incidence and its tendency to recur [1]. The prevalence of USD is increasing in both industrialized and developing countries, affecting both adults and children [2]. According to the European Association of Urology, in 2017, the global prevalence of USD was between 1–20%. In Africa, a prevalence of 5.72% was reported in 2012 in Chad and 12.08% in 2013 in Burkina Faso [2,3]. A hospital-based study conducted in

2014 in the Far North region of Cameroon reported a prevalence of 5.52% [4]. The World Health Organization defines USD as the presence of one or more stones located at any level within a segment of the urinary tract. Urinary stones are solid concretions of dissolved minerals in urine, which can deposit in the kidneys, ureters, bladder, or urethra [1]. The location of the stones varies by age. Urethral and bladder stones are prerogative of young children, while ureteral and renal stones are more common in adults [1]. The exact mechanism by which stones are formed is unknown, however, several risk factors have been identified, including life style habit (low fluid intake, alcohol consumption, and smoking), environmental factors (hot and dry climate), age, gender, diuretic use, chronic urinary tract infection by urease-producing organism, and the presence of comorbidities (hypertension, diabetes mellitus, obesity, and gout) [3,5,6]. Generally, the clinical features of USD are related to the location and the size of the stone [1].

The clinical presentation of patients with USD could vary from the absence of symptoms to symptoms such as renal colic, haematuria, frequency, and dysuria. Delays in consultation are often responsible for serious complications such as impairment of renal function, urinary fistula formation, ureteral scarring and stenosis, ureteral perforation, urosepsis, and renal failure [1,2,6].

USD affects health and quality of life in all age groups without sex distinction. Several studies suggest a rising trend in sub-Saharan Africa. Cameroon is crossed by a stone belt in its northern part, which explains the high prevalence of the disease in the country. We have limited data on this condition in Cameroon, despite it being one of the most common causes of urological consultation in developed countries. We, therefore, sought to highlight the epidemiological profile of patients presenting with Urinary Stone Disease in Cameroon.

Methods

Study design, setting, and participants

This was a 5-year retrospective study involving the review of records of patients diagnosed with urinary stones at the Medico-Surgical Centre of Urology (CMCU) in Douala, Cameroon, between January 1st, 2017, and December 31st, 2022. Of the 365 patients diagnosed with USD during the study period, the records of 357 individuals diagnosed with urolithiasis, confirmed by a KUB abdominal X-ray and an abdominal CT scan, and meeting inclusion criteria were included in the study. We excluded the records of patients with incomplete clinical data.

Study procedure

We obtained administrative authorization for this study from the Regional Delegation of Public Health for the Littoral Region and ethical approval from the Institutional Review Board of the Faculty of Health Sciences, University of Buea, Cameroon.

Data collection and management

Data were collected from eligible files using a data extraction form organized into four sections, including socio-demographic data, lifestyle, past history, and clinical and para-clinical findings.

Collected data was analysed using Statistical Package for Social Sciences version 23.0. Quantitative variables were presented as means and standard deviations or as median and inter-quartile range when appropriate, while qualitative variables were presented as frequencies and proportions.

Results

Socio-demographic profile of patients with urinary stone disease Between January 1st, 2017, and December 31st, 2022, there were 7394 urological consultations at the Medico-Surgical Centre of Urology in Douala, Cameroon, with 365 (4.9%) of these being for USD.

Of the 357 patients with USD included in our study, 236 (66.1%) were male and 121 (33.9%) were female, giving a male-to-female ratio of 1.98:1. The mean age of the study population was 43.4 ± 13.5 years (range: 4–81 years). The most affected age group were those aged between 40 and 60 years accounting for 42.9% ($n = 153$), while those aged greater than 80 years were the least affected, accounting for only 0.56% ($n = 2$). The greatest proportion of our study population lived in urban settings accounting for 95.0% ($n = 339$). BMI computation was possible for 242 (67.8%) patients of which, 40.8% ($n = 98$) were overweight, and 43.3% ($n = 104$) were obese. The socio-demographic profile of the patients is summarised in Table 1.

Variables	Category	Frequency (n)	Percentages (%)
Gender	Male	236	66.1
	Female	121	33.9
Age group, years (Mean = 44.3; SD = 13.5)	<20	10	2.8
	20–40	145	40.6
	40–60	153	42.9
	60–80	47	13.2
	≥80	2	0.5
BMI	18.5–24.9	40	16.5
	25.0–29.9	98	40.5
	30.0–34.9	68	28.1
	35.0–39.9	26	10.8
	≥40.0	10	4.1
Residence	Urban settings	339	95.0
	Rural settings	18	5.0

Lifestyle habits and past history of patients with urinary stone disease

One hundred and forty-eight patients (41.5%) frequently consumed alcohol, while seven (2.0%) had a history of cigarette smoking. Three hundred and forty-two (95.8%) patients had the habit of drinking less than 1L of water per day, and only 15 (4.2%) patients were drinking equal to or more than 1L of water per day, as seen in Table 2.

We recorded 222 (62.2%) patients with a relevant past urological history. Of these, 193 (86.9%) had a history of recurrent urinary stone disease, 20 (9.0%) had a history of malformations of the urinary tract, and 9 (4.1%) had a history of urologic cancer. One hundred and sixty-two (45.4%) patients had a history of a previous surgical procedure, with urologic surgeries including pyelotomy, ureterotomy, nephrolithotomy, and nephrectomy making up 61.5% (n = 117). Appendectomy and herniorrhaphy accounted for the remaining 38.5% (n = 45). Of the 357 patients, 114 (31.9%) had comorbid conditions, with obesity accounting for 30.7% (n = 35) of all comorbidities, followed by diabetes (32 (28.1%)), and hypertension (25 (21.9%)). Other comorbidities included acute kidney injury, chronic kidney disease, gout, and urinary tract infections. A total of 16 (4.5%) patients took calcium supplementation, while 3 (0.8%) patients were on a protease inhibitor. Table 2 summarises the lifestyle habits and past history of the patients with urolithiasis.

Variables	Frequency (%)
Frequent alcohol consumption	148 (41.5)
Cigarette smoking	7 (2.0)
Daily water intake	
<1L	340 (95.8)
≥1L	15 (4.2)
History of urologic disease	222 (62.2)
Urinary stone disease	193 (86.9)
Urologic malformation (solitary kidney & horse-shoe kidney)	20 (9.0)
Urologic malignancy	9 (4.1)
Relevant surgical history	162 (45.4)
History of urologic surgery	117 (61.5)
History of other surgeries	45 (38.5)
Presence of comorbidities	114 (31.9)
Obesity	35 (30.7)
Diabetes	32 (28.1)
Hypertension	25 (21.9)
HIV	5 (4.4)
Others	17 (14.9)
History of calcium supplementation	16 (4.5)
History of Protease inhibitor consumption	3 (0.8)

Table 2: Lifestyle habits and past history of patients with urolithiasis.

Clinical Profile of Patients with Urinary Stone Disease

Three hundred and thirty-two (93%) of our study population presented renal colic as the main symptom, 70 (19.4%) presented with haematuria, 60 (16.8%) presented with dysuria, and 7 (2%) presented with an increase in urinary frequency (Figure 1).

Right-sided stones predominated in our study, accounting for 158 (44.3%), followed by left-sided stones accounting for 37.5% (n = 134), and bilateral stones representing 18.2% (n = 65).

Two hundred and two (56.6%) patients had stones at the level of the kidneys, 102 (28.6%) at the level of the ureters, 11 (3.1%) at the uretero-vesical junction, 4 (1.1%) in the bladder, and 4 (1.1%) urethra. Thirty-four (9.5%) patients had multiple stones in more than one location.

The stone size ranged from 4–300 mm, with 95% (n = 339) being between 1–30 mm. Seventy-two (20.2%) patients had hydronephrosis at the time of diagnosis of their USD. The characteristics and location of the stone are shown in Table 3.

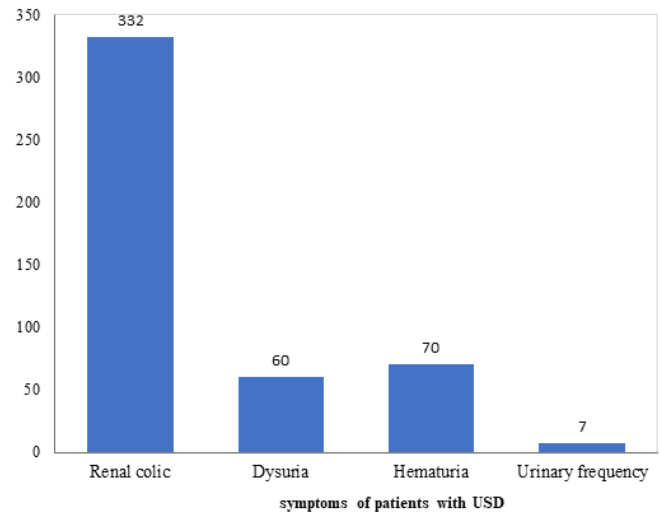


Figure 1: Main-presenting symptoms of patients with urolithiasis.

Location of stone	Frequency (n)
Lateralization	
Right side	158 (44.3)
Left side	134 (37.5)
Bilateral	65 (18.2)
Site of stone	
Kidney	202 (56.6)
Ureter	102 (28.6)
Uretero-vesical junction	11 (3.1)
Urinary bladder	4 (1.1)
Urethra	3 (1.1)
Size of stones (mm)	
1–30	339 (95.0)
31–60	8 (2.2)
61–90	0 (0.0)
>90	10 (2.8)
Presence of hydronephrosis	72 (20.2)

Table 3: Localization and size of stones in patients with urolithiasis.

Biochemical Profile of Patients with Urinary Stone Disease

Three hundred and thirty-two (93.0%) patients had a documented serum creatinine level. The serum creatinine ranged from 9–42 mg/l. Of the 332 patients with documented serum creatinine, 233 (70.2%) had a level within the reference range of 6–12 mg/l, while

99 (29.8%) patients had an elevated creatinine of more than 12 mg/l.

Three hundred and four (85.2%) patients had a documented serum urea level. The serum urea ranged 6–180 mg/dl. Of the 304 patients with documented serum urea, 265 (87.2%) had a level within the reference range of 15–45 mg/dl, while 39 (12.8%) had elevated serum urea levels. One hundred patients (28.0%) had a documented serum calcium level. The serum calcium ranged from 6–94 mg/dl. Of the 100 patients with documented serum calcium, 64 (64.0%) had a level within the reference range of 8–10 mg/dl, while 36 (36.0%) had elevated calcium levels.

Thirty participants (8.4%) had a documented serum uric acid level. The serum uric acid ranged from 7–95 mg/l. Of the 30 patients with documented serum uric acid, 24 (80.0%) had a level within the reference range of 30–70 mg/l, while 6 (20%) had elevated serum uric acid levels (Table 14).

Of the 357 patients, 29 (8.1%) had calciuria, 25 (86.2%) of which was between 100 and 300 mg/24 hours and 4 (13.8%) was greater than 300 mg/24 hours. The biochemical characteristics of the patients are summarised in Table 4.

Variables	Frequency (%)
Serum creatinine (n = 332)	
Normal (6–12 mg/l)	233 (70.2%)
High (> 12)	99 (29.8)
Serum urea (n = 304)	
Normal (15–45 mg/dl)	265 (87.2)
High (>45)	39 (12.8)
Serum calcium (n = 100)	
Normal (8–10 mg/dl)	36 (36.0)
High (>10)	64 (64.0)
Calciuria (n = 29)	
Normal(100–300 mg/24 hours)	25 (86.2)
High (300 mg/24 hours)	4 (13.8)
Serum uric acid (n = 30)	
Normal (30–70 mg/l)	24 (80.0)
High (>70)	6 (20.0)

Table 4: Biochemical characteristics of patients with urolithiasis.

Discussion

With the aim of describing the epidemiological profile of patients with USD in Cameroon, we retrospectively studied the records of 357 patients with USD at the Medico-Surgical Centre of Urology in Douala, Cameroon.

We determined the prevalence of USD to be 4.9%. This was similar to 5.52% and 5.72% reported by Ngaroua et al. in 2014 in Cameroon and Rimtebaye et al. in 2012 in Chad, respectively [3,4]. The prevalence of USD in the current study was higher than the

estimated prevalence of 2.77% reported by Angwafo et al. in 2000 in Cameroon [5]. This difference could be attributable to profound modifications in the lifestyle habits of the population with time in favour of lifestyles that predispose to urinary stone formation.

More males were diagnosed with USD compared to females during the study period, with a male-to-female ratio of 1.95:1. This finding was consistent with that observed by Angwafo et al., who reported a male-to-female ratio of 1.65:1, and Ngaroua et al. in 2014, who reported a male-to-female ratio of 2.53:1 [2,5]. Emokpea et al. in Nigeria in 2012 observed a higher male predominance (sex ratio 6:1) [7]. This high male predominance could be because men are generally involved in more strenuous activities than women. These activities demand more fluid to maintain fluid balance, which is seldom respected by men [7]. As a result, men are predisposed to urinary calcium excretion, higher oxalate and uric acid concentrations, and lower concentrations of citrate, which increase the risk of stone formation [8].

The mean age of patients with USD in our study was 43.4 ± 13.5 years (range: 4–81 years). This was similar to that reported by Angwafo et al. in Cameroon, who had a mean age of 41.65 years [5]. Ngaroua et al. in Nigeria reported a lower mean age of 38.8 years [4]. This could be due to the fact that they had more paediatric USD patients in their study. In terms of age-specific distribution, our result is similar to that of Ngaroua et al., who reported that urinary stones were more common in the age group 46–60 years [4].

Almost all the patients with USD in our study consumed less than 1 litre of water per day, consistent with findings gotten by Zoung et al. and Rimtebaye et al. [3,4]. In addition, in the current study, almost half of the patients consumed alcohol frequently, and 7% smoked cigarettes. Cigarette smoking and alcohol consumption have been determined to contribute to stone occurrence [9,10]. People with a high BMI tend to have higher excretion of urine oxalate, uric acid, and phosphate, favouring urinary stone formation [11]. In the current study, 83.5% of patients had a BMI greater than 25 kg/m², similar to the results reported by Mathiyala et al., in India. Patients diagnosed with USD in our study had colicky abdominal pain as the main presenting symptom. This was in congruity with the result reported by Kabore et al. [2]. Ngaroua et al. and Rimtebaye et al. reported dysuria as the main symptom [3,4].

In our study, the upper urinary tracts constituted the main anatomical site for stone location, with the renal pelvis taking precedence. This tallies with the report by Angwafo et al. [5]. Stone occurrences in the bladder and urethra were relatively few. However, our finding was contrary to that reported by Ngaroua et al., who found the lower urinary tracts to be the commonest anatomical location for USD [2].

Our study was limited to a few variables, whereas a variety of other factors affect USD. Also, our study was a single-centre study, which may have limited our sample size. However, given the fact that the centre is a specialized medico-surgical centre for urology,

it acts as a referral centre and receives patients from all over the national territory, making the results highly representative.

Conclusion

Urinary stone disease is common in Cameroon, especially among the age group of 20–60 years. The disease affects men more, and the stones are located in the upper urinary tracts in nine of every ten patients. USD occurs more among patients who reside in urban settings, who consume less than 1 litre of water per day, who have a BMI greater than 25 kg/m², and in patients with a significant past urologic history. More research is needed to study other factors that predispose to USD and test for associations.

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