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Research Article

Epidemiological Profile of Urinary Lithiasis in the Urology Department of Libreville University Hospital from January 2020 to September 2024

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Abstract

Introduction: Urinary stone disease is a common condition. They mainly form in the kidney but can occur anywhere in the urinary tract, leading to complications that can be serious. The aim of this study was to determine the epidemiological profile of urinary stone disease in the Urology Department of the Libreville University Hospital Center (CHUL) from 2020 to 2024. Materials and Methods: This is a retrospective descriptive study of patients treated for urinary lithiasis in the Urology Department of the CHUL between January 1, 2020, and September 30, 2024. Results: 184 patients were hospitalized during the study period for urinary lithiasis. The mean age was 42 ± 16.2 years, ranging from 11 to 85 years, and the sex ratio was 1: 1. Renal colic was the presenting symptom in 84.2% of cases. The stones were located in the upper urinary tract in 77.7% of cases. CT urography was performed in 90.2% of cases. The stones measured an average of 15.2 mm and were complicated in 50.5% of cases, including hydronephrosis (23.9%) followed by ureterohydronephrosis (19%). Conclusion: Urinary lithiasis is a common condition predominantly located in the upper urinary tract. This condition most often affects young, professionally active adults. The presence of serious complications highlights the need for earlier diagnosis of this condition.

Keywords

Lithiasis, Urinary Tract, Urology, Epidemiology

1. Introduction

Urinary lithiasis is a condition resulting from the abnormal precipitation of normal urine constituents within the urinary tract, leading to the formation of a stone [1]. Although approximately 90% of stones are passed spontaneously, the remaining stones require monitoring or appropriate medical or surgical treatment [2]. Furthermore, urinary lithiasis can lead to complications, the most serious of which can result in kidney damage, making it a potentially serious condition.

Urinary lithiasis is a common condition, and its incidence

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is steadily increasing in all industrialized and developing countries. Its prevalence varies by region and continent; for example, it was estimated at 8.8% in North America between 2007 and 2011 [3], between 5 and 10% in Europe between 2000 and 2010 [4], and between 1 and 5% in Asia [5].

The epidemiology of urinary lithiasis depends heavily on sociodemographic characteristics that have continued to evolve in recent years due to industrialization, changes in dietary habits, sanitary conditions, environmental factors, and the prevalence of conditions that predispose individuals to the risk of lithiasis (obesity, diabetes, metabolic syndrome) [6]. Africa is also affected by the rise in this incidence, which remains difficult to determine precisely in the general population, as numerous biases can distort the values of certain collected data. In Gabon, few studies have been conducted on this topic, which motivated this study, whose aim was to determine the epidemiological profile of patients hospitalized for urinary lithiasis in the urology department of the Libreville University Hospital.

2. Materials and Methods

This was a retrospective, descriptive, and analytical study conducted in the Urology Department of the Libreville University Hospital from January 1, 2020, to September 30, 2024. All medical records of patients hospitalized for urinary lithiasis with evidence of urinary stones on imaging (unprepared abdominal X-ray, urinary tract ultrasound, and uro-CT) were included.

The variables studied were, from an epidemiological perspective: age, sex, occupation, region, marital status, and personal and family history; from a clinical perspective: time to consultation, place of origin, reason for consultation, and clinical signs; and from an imaging perspective: uncontrasted abdominal X-ray, urinary tract ultrasound, and urinary tract CT scan.

Data were collected on a survey form based on medical records and entered into Excel 2013.

Statistical analysis was performed using IBM SPSS version 26 and XLSTAT version 2016.02.27444.

Categorical variables were presented as counts and percentages, while quantitative variables were expressed as mean ± standard deviation or as median with interquartile range.

3. Results

One hundred eighty-four patients were hospitalized for a urinary stone condition, representing a prevalence of 14.8%. The mean age was 42 ± 16.2 years, ranging from 11 to 85 years. The most common age group was 20-39 years, accounting for 40.2% (n = 74). The sex ratio was 1. Eighty-eight (n = 88), or 47.8% of patients, were employed, and 22.3% (n = 41) of patients were unemployed. The city of Libreville, the capital of Gabon, was the place of residence for 72.3% of patients (n = 132). There were 78 single patients, representing 42.4% of the study population. Patients were referred from outpatient clinics in 38.6% of cases (n = 71) and from the emergency department in 34.2% (n = 63) of cases. The sociodemographic data are summarized in Table 1.

Table 1. *Socio-demographic characteristics of the study population.*

Variable	n	%
Age (years)		
< 20	13	7,1
20-39	74	40,9
40-59	71	38,6
≥ 60	26	14,1
Total	184	100
Occupation		
Pupil/student	35	19
Unemployed	41	22,3
Retirement	20	10,9
Active	88	47,8
Total	184	100
Antecedent		
None	153	83,2
Urolithiasis	30	16,3
Nephrectomy	1	0,5

The time to presentation ranged from a few hours to 6 years, with a median of 14 days and an interquartile range of 3 to 90 days. A history of urinary tract stones was found in 16.3% of cases (n = 30). Hypertension and diabetes were associated conditions in 8.2% and 4.3% of cases, respectively. Renal colic was the presenting symptom in 84.2% of cases, followed by lower urinary tract symptoms in 17.3% (Table 2).

Urinary lithiasis was complicated in 50.5% of cases, including hydronephrosis in 23.9% of patients (n=44) and uretero-hydronephrosis in 19% (n=35) of patients, as shown in Table 2.

Two types of imaging were performed: urinary CT scans in 166 patients (90.2%) and urinary tract ultrasound in 18 patients (9.8%).

Table 2. *Clinical characteristics patients.*

Variable	n	%
Sign or clinical symptoms		

Variable	n	%
Renal colic	155	84,2
Luts	32	17,3
Hematuria	10	5,4
Nausea/vomiting	7	3,8
Fever	6	3,3
Lower back pain	3	1,6
Hypogastric pain	2	1,1
Iliac fossa pain	1	0,5
Acute urinary retention	1	0,5
Total	184	100
Complications		
Hydronephrosis	44	23,9
Ureterohydronephrosis	35	19
Ureteral dilatation	4	2,2
Pyelonephritis	6	3,2
Pyonephrosis	2	1,1
Destroyed atrophic kidney	2	1,1
No complication	91	49,5
Total	184	100

Luts: lower urinary tract symptoms

Urinary stones were located solely in the upper urinary tract in 77.7% of cases (n=148) and in the lower urinary tract in 13.6% (n=25) of cases. The stones were located in the ureter in 55.4% (n=102) and in the kidney in 21.2% (n=39) of cases. Table 3 describes the location of the stones within the urinary tract.

Urinary stones were located on the right side in 50% of patients and on the left side in 32.9% of cases. The stones measured on average 15.2 mm, with a range of 3 mm to 64 mm. The median stone size was 11.0 mm.

Table 3. *Characteristics of the lithiasis.*

Variable	n	%
Site of the lithiasis		
Renal	39	21,2
Ureteral	102	55,4
Vesical	20	10,9
Ureteral and bladder	15	8,2
Renal and Ureteral	7	3,8
Renal and Ureteral and bladder	1	0,5
Total	184	100
Laterality of the lithiasis		
Right	82	50
Left	54	32,9
Bilateral	28	17,1
Total	164	100
Diameter of the lithiaisis (mm)		
< 5	9	4,9
5 - 9	43	23,4
10 - 20	62	33,7
20	24	13
Not specified	46	25
Total	184	100

mm: milimeter

4. Discussion

The prevalence of urinary stones varies widely around the world [3-5]. In 2023, Kassaw et al. [7] reported a prevalence of urinary stones of 9.4% in sub-Saharan Africa. The hospital admission rate for urinary lithiasis in the study was 14.8%, similar to those reported by Diangienda et al [8] in the Democratic Republic of the Congo and. in Ethiopia, which were. and 18.1%, respectively. Boumzaoued et al [9] in Morocco in 2015 and Kassogue et al in Mali in 2020 described hospital admission rates slightly higher than ours, which were 25.36% and 20.35%, respectively. Gabon's climate is hot and humid, and during hot periods, the human body becomes more dehydrated, which can lead to more concentrated urine and thus a higher level of urine supersaturation. If this dehydration is not compensated for, it can lead to the crystal nucleation phase. Several studies [11, 12] have demonstrated the link between a hot climate and the occurrence of stone formation. Thus, Soucie et al [11] were able to show that ambient temperature and sunlight exposure are significant risk factors for stone formation.

The mean age was 42 years, similar to those reported by other authors such as Ondziel et al [13] in Brazzaville and Mbouche et al [14] in Yaoundé, which were 42.05 and 40.46 years, respectively. In our setting, urinary lithiasis most commonly occurs in young adults. Thus, the majority of patients (47.8%) were employed. Indeed, occupation can play a role in the development of stones, particularly if working conditions do not allow workers to stay well-hydrated or have access to

restrooms. This results in reduced urine output and concentrated urine, which can promote stone formation [15, 16]. Added to this are dietary changes and a lack of physical activity, which are also factors that promote stone formation [5].

The sex ratio in our study was 1: 1, similar to that reported by Neffati et al [17] in Tunisia in 2007. In contrast to Kassogué et al [10] in Kati, Mali, in 2020, and Diallo et al [18] in Thiès, Senegal, in 2015, where the sex ratio was 2.86 and 1.7, respectively. There has been a male predominance in terms of prevalence and incidence of kidney stones for nearly a century, with a sex ratio ranging between 1.5 and 2.5. The involvement of male sex hormones in the pathogenesis of urinary tract stone formation may be the possible explanation for this result [19].

This predominance can also be explained by the role of estrogen in stone formation; estrogen actually has a preventive effect in women by promoting the excretion of citrate in the urine, which solubilizes calcium [20]. However, a narrowing of the gender gap has been observed, likely linked to changes in dietary habits and the rise in other risk factors such as diabetes and obesity [5].

The clinical presentation of urinary lithiasis is indeed related to the location of the stone. Renal colic accounts for 1-2% of reasons for admission to the emergency department [21]. It was present in 84.2% of the study patients and remains the most frequently observed symptom in urinary lithiasis, as reported by several authors [14, 22, 23]. From a diagnostic imaging perspective, non-contrast CT urogram remains the gold standard imaging test. It was performed in 90.2% of patients, and its implementation in our setting is facilitated, on the one hand, by the health insurance coverage enjoyed by a large portion of the population, which reduces its cost, and, on the other hand, by the availability of this examination in more than a dozen hospitals in Libreville.

Regarding the location of the stones, more than three-quarters were found in the upper urinary tract. This finding has been reported by numerous authors [24, 25]. This can be explained by the fact that the vast majority of stones form in the kidneys [26]. The prevalence of urinary stones in the lower urinary tract, particularly in the bladder, is observed in certain regions of the world and is often due to specific sociocultural factors and malnutrition [27]. Other factors may contribute to the development of bladder stones, such as advancing age and the associated subvesical obstructive pathologies, which are linked to reduced urine output and increased urine concentration [28].

Regarding stone laterality, stones were predominantly on the right side in 50% of cases. Other authors report the left side as being the most common [14, 29, 30]. The predominance of one side over the other is not demonstrated in the literature, and nothing predisposes to it except for a unilateral malformation of the urinary tract [26].

The size, number, and location of the stone are important factors in determining the treatment indication but also in the likelihood of spontaneous passage. The average stone size was 15.2 mm, with a median size of 11 mm, close to that reported by Mbouche et al. [14], which was 9 mm. Furthermore, complications were present in 50.5% of cases, including instances of pyonephrosis and destroyed kidneys. These findings namely the large size of the stones and the sometimes severe complications could be explained by delayed diagnosis.

5. Conclusion

Urinary lithiasis is a common condition in our setting. This condition most often affects young, professionally active adults. It affects men and women equally. Renal colic is the primary indicative symptom, with the right kidney being the most commonly affected. The presence of serious complications highlights the need for earlier diagnosis of this condition.

Abbreviations

Luts	Lower Urinary Tract Symptoms
mm	Millimeter

Author Contributions

Ndang Ngou Milama Steevy: Methodology, Conceptualization, Writing – original draft

Adande Menest Elvire Felicite: Visualization, Writing – review & editing

Mbethe Dimitri: Writing – review & editing

Mougougou Adrien: Writing – review & editing

Abeme Lesly: Writing – review & editing

Bissiriou Izoudine: Investigation

Nguyen Akendengue Leslie: Methodology

Allogho Mbouye Gloire: Visualization

Conflicts of Interest

The authors declare no conflicts of interest.

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