Scientific Research Publishing

Open Journal of Urology, 2022, 12, 157-167
https://www.scirp.org/journal/oju
ISSN Online: 2160-5629
ISSN Print: 2160-5440

Epidemiological Profile of Patients Suffering from Urolithiasis in African Urological Environments from 2016 to 2020

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How to cite this paper: Ondziel-Opara, S.A., Ondongo Atipo, A.M., Onguele Okemba, G., Banga Mouss, R.B., Dimi Nyanga, Y.I., Odzebe, A.W.S. and Bouya, A.P. (2022) Epidemiological Profile of Patients Suffering from Urolithiasis in African Urological Environments from 2016 to 2020. *Open Journal of Urology*, **12**, 157-167.
https://doi.org/10.4236/oju.2022.122016

Received: October 7, 2021
Accepted: February 25, 2022
Published: February 28, 2022

Abstract

Introduction: Urolithiasis is a very common pathology in the world. Its epidemiological profile varies from one region to another. In Africa in general and in the Congo in particular, it seems to be unknown. **Objective:** To determine the sociodemographic, diagnostic, therapeutic and evolutionary paraclinical parameters of 167 adult patients with urolithiasis. **Patients and Methods:** Cross-sectional, descriptive, retrospective study conducted in the urology department of Brazzaville University Hospital over a period of five years. We studied sociodemographic, therapeutic and evolutive. **Results:** During the study period 167 patients were treated for urolithiasis out of 2236 patients, a hospital frequency of 7.46%. The sex ratio M/F was 1.49. The average age of the patients was 42.05 years. They were overweight and/or obese in 53% of cases. Workers accounted for 46.53% of cases, with a low socio-economic level (42.5%) and a lower level of education (68.31%). There was a high percentage of complications, dominated by hydronephrosis (66.33%) and urinary tract infection (59.4%). The treatment was surgical in the majority of cases or 74.8%. Thirty-three patients had a lithiasis recurrence, a frequency of 19.7%. **Conclusion:** Urolithiasis is common. Being overweight is the most found risk factor. Lithiasis recurrence affects nearly one in five patients.

Keywords

Urolithiasis, Epidemiology, Brazzaville

1. Introduction

Urolithiasis (UL) is an ancient and widespread pathology in the world [1]. While

the epidemiological profile and its etiological factors continue to increase [2], its occurrence depends on the health conditions, dietary habits and standard of living of the populations [1].

The prevalence of UL differs from region to region. Indeed, it is 7% to 13% in North America, 5% to 9% in Europe and 1% to 5% in Asia [3]. However, in Africa, its prevalence is little known due to a low attendance of hospital structures and the absence of a study extended to the population [4]. However, several indicators tend to show its increase due to global climate change, increasing socio-economic status, westernization of diet and lifestyle [5].

While several studies in Congo have been conducted in particular on open-air surgery in urolithiasis [6], UL of children [7] and lithiasis of the upper urinary tract [8], however none of them has been devoted to the epidemiological profile of UL. It is in this perspective that we proposed to carry out this study with the objective of describing the epidemiological profile of UL in the urology department of the CHUB.

2. Patients and Methods

We carried out a descriptive study with retrospective collection from January 2016 to December 2020, five years in the urology and andrology department of the Brazzaville University Hospital.

Our sample consisted of all patients who had been treated for UL during this period and meeting the inclusion criteria; that is, all patients treated and having at least one imaging examination confirming the diagnosis.

We excluded all patients who were not treated, those whose information was missing from the operating and/or hospitalization records or those without imaging.

The parameters studied were: Socio-demographic *i.e.* age, sex, body mass index (Classified as follows: Normal: BMI < 25 kg/m^2; overweight: 25 - 30 kg/m^2, Obesity: >30 kg/m^2), level of education, socio-professional status, place of origin, socio-economic level, Clinical (functional signs related to UL or associated with UL: pain, urination disorders, hematuria, digestive disorder, fever, Previous history and treatments (Hypertension, diabetes, urinary tract infection, other pathologies, family history of UL, physical signs: lumbar sensitivity, bladder globe, pain in the ureteral points, large kidney), paraclinical (ECBU, biological assessment: serum creatinine, azotemia, serum calcium, Urinary Tract Ultrasound, radiography of the urinary tree without preparation (AUSP), A computerized tomography (CT) urogram and intravenous urography (IVU). therapeutic (type of treatment: open surgery, pharmacological treatment, endoscopic treatment), progressive (Uretero-hydronephrosis, urinary tract infection, AORF, pyonephrosis). In the minor, it is the socio-economic level of the parents that has been taken into account, to do this we have used the British classification of economic status taking into account the prestige of the profession [9]. There are thus three categories namely:

- Category 1: with a high socio-economic level, consisting of groups I (management employees and senior managers) and II (management employees and lower managers);
- Category 2: average socio-economic level, consisting of groups III (intermediate employees), IV (small employers and self-employed workers) and V (lower employees in supervision, crafts and similar trades);
- Category 3: low or low socio-economic level, consisting of groups VI (employees in semi-routine jobs) VII employees in routine jobs) and VIII (never worked or long-term unemployed).

For the retired subject, it is the profession exercised the longest that has been considered.

Data entry and processing was carried out using Epi-info software version 7.2.2.6 and data analysis was carried out on SPSS 22 statistical software. The various tables and graphs were generated using the Microsoft Office Excel 2016 software.

For quantitative variables, we calculated means and standard deviations.

3. Results

During the study period, there were 167 hospitalized UL cases out of a total enrolment of 2236 patients, a frequency of 7.46%.

The annual distribution of patients with UL is shown in Figure 1.

The median age of our patients was 41 years and the mean age was 42.05 ± 18.40 years with extremes of 6 and 96 years. This average age was 46.12 ± 18.27 years for men and 35.93 ± 16.61 years for women, the age group from 30 to 50 years constituted 39.60% of cases.

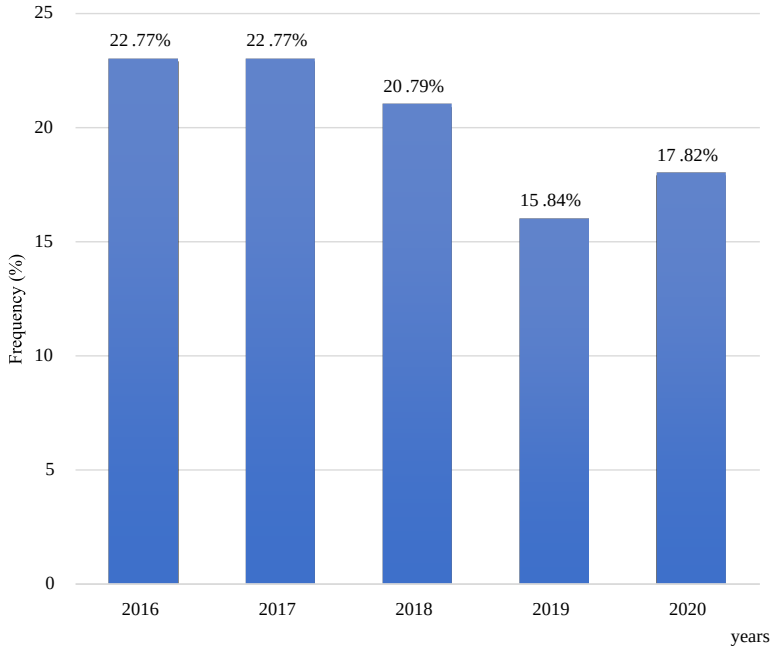

Figure 1. Recruitment of UL by year.

There were 67 women (40%) and 100 men (60%).

The sex ratio M/F was 1.49, varying by the age group (Figure 2).

In the male population, the frequency of UL gradually increased to a peak between the age of 40 and 49 (Figure 3).

Our population had 120 patients or 71.86% with a level of education at least at the secondary level and 47 patients or 28.14% were at most at the primary level.

One hundred and fifty-nine patients or 95.2% came from the urban area.

Workers made up a workforce of 78 (46.7%) patients, students, retirees and the unemployed made up a workforce of 31 (18.6%), 15 (9%) and 43 (25.7%) patients respectively.

Our population consisted of 19 miners. Of all adult urolithiasis patients, 86 patients (51.5%) were single and 62 patients (37.1%) were married or common law.

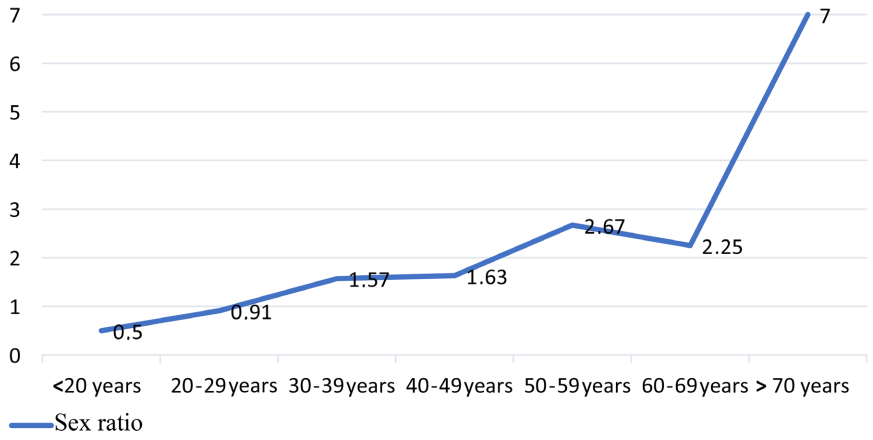

Figure 2. Change in sex ratio with age group.

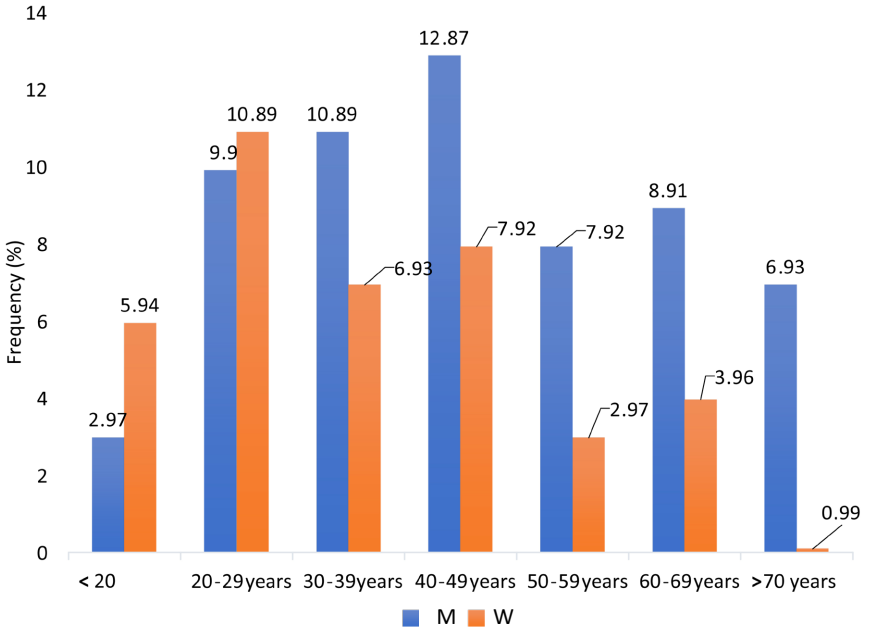

Figure 3. The age and sex distribution.

Our study population consisted of 42.5% of patients with a low socioeconomic level, 41.3% of patients with a medium level and 16.2% of a high level. In terms of the history, hypertension and diabetes were found in 33 (19.8%) and 25 (15%) patients, respectively, repeated urinary tract infections in twelve (7.2%) patients.

The main symptom was pain regardless of its location. It was renal colic in 117 patients (70%), hypogastric pain in 24 patients (14.4%), a lumbar fossa pain in fifteen patients (9%), and an iliac fossa pain in 2 patients (1.2%). Urination disorders were also found; pollakiuria in 46 patients or 27.5%, dysuria in 40 (24%) patients, urination burns in 27 (16.2%) patients, haematuria in 24 (14.4%) of patients and acute urine retention in 18 (10.8%) patients. When these signs were accompanied, fever was present in 48 patients or 28.7%, nausea and vomiting in 45 patients (27%). During the physical examination, a sensitivity of the lumber fossa was found in 99 patients or 59.3%. Upper, middle and lower ureteral point pain was found in 17 patients (10.2%), fifteen patients (9%) and eight patients (4.9%) respectively. Twenty eight patients (16.8%) had a bladder globe; 25 patients (15%) had an abdominal and/or lumbar scar, and fifteen patients (9%) had a large kidney.

Urinary Tract without Preparation (AUSP) was performed in 134 patients and demonstrated UL in 111 patients or 79%. The Urinary Tract Ultrasound was performed in all patients and showed UL in 150 patients, or 90.10%. Single patients, were noted in 68 patients, or 40.7%. The computerized tomography (CT) urogram was used in 101 patients and found UL in all patients while IVU was performed in 66 patients and diagnosed all patients with UL. The frequencies of patients with two stones and at least three stones were 27.5% and 31.7% respectively (46 and 53 patients). The average number of calculations was 2.1. UL of the upper urinary tract, by far the most represented, was found in 127 patients or 76% of all UL.

Cystolithotomy was the most performed intervention with 25 cases or 20% of all patients treated with open surgery, then pyelolithotomy with 31 patients or 24.8%, the then nephrolithotomy and the ureterotomy with respectively 25 patients (20%) and 15 patients (12%) and finally nephrectomy with 11 patients or 8.8%. Note that 18 cases (14.4%) were subjected to double surgery, depending on the location of the LU and the state of the renal parenchymal. After surgery, 5% of patients presented with a residual stone. There was a high percentage of complications, dominated by hydronephrosis (66.33%) and urinary tract infection (59.4%). Thirty-three patients (19.7%) had at least one recurrence.

4. Discussion

The prevalence of UL has been steadily increasing around the world over the past two decades; but it remains highly variable depending on the geographical location due to multiple factors specific to each culture and race [3].

Romero *et al.* reported a national prevalence increasing from 3.8% between 1976-1980 to 5.2% between 1988-1994 in the United States [10]; Then Scales *et*

al. increased this prevalence to 10.6% among men and 7.1% among women [11]. Several studies would tend to show in various non-industrialized countries, a gradual evolution of the epidemiological profile of lithiasis patients towards that observed in Western Europe and the United States [12].

This increase is also seen in this study. We obtained a hospital frequency of 7.46% compared to the previous study conducted by Odzébé *et al.* which reported a frequency of 7.30% [6] a slight increase of about 0.16%. Some results in the literature were consistent with ours. Notably Zeng *et al.* in China [13], Kumari *et al.* in India [14], Kaboré *et al.* in Burkina Faso [4] reported a prevalence of 6.4%, 7.6% and 12.52% respectively. These results can be justified on one hand by the fact that, as in our case, they are countries with a hot and humid climate. Indeed, some studies have proven the correlation between seasonal fluctuations in urinary excretion of calcium and oxalate and the number of hours of monthly sunshine and the occurrence of lithiasic episodes [15]. High temperatures increase insensitivity to sweating, which can lead to more concentrated urine; this event then promotes urinary crystallization and therefore the formation of UL [16].

On the other hand, the majority of our study population came from urban areas where the trend is towards the westernization of eating habits as reported by Loumingou *et al.* [17].

On the other hand, Mobima *et al.* in the Central African Republic reported a prevalence of 3.07% [18]. These results show a lower prevalence than ours and could be explained by the fact that it was a multicentric study because these patients came from different departments of the city for the realization of an ultrasound in their center.

The highest prevalence was reported by Ahmad *et al.* in Saudi Arabia at 19.1% [19].

The prevalence and incidence of UL varies enormously by age, with a low frequency in childhood and then rises to peaks between the 4th and 6th decade of life [3].

The average age of our patients was 42.05 ± 18.40 years, with extremes of 6 and 96 years. Ten years before our study, Odzébé *et al.* in Congo had reported an average age of 52.13 years [6]. We have thus noted the current precocity of the occurrence of lithiasis in our population. This was similar to recent data in the literature presenting urolithiasis disease as a condition of young adults [20]. These results were similar to those reported in the African literature. Ze Ondo *et al.* in Senegal [21], Mobima *et al.* in the Central African Republic [19] and Omisanjo *et al.* in Nigeria [22] reported an average age close to ours, *i.e.* 42.7 years, 40 years and 40.4 years respectively. In the study surgical Management of Urolithiasis of the Upper Tract—Current Trend of Endourology in Africä bringing together several sub-Saharan countries including Congo, Cassell III *et al.* reported an overall average age of 39.1 years [20]. Kaboré *et al.* reported the lowest average age in sub-Saharan Africa in 35 years [4].

Socio-economic improvement, especially among the youngest strata, could be explanations for this result. This could also be explained by the fact that developing countries, particularly in Africa, have a predominantly young population with a median age often below twenty, unlike Western countries where there was aging population [23]. Ketabchi *et al.* in Iran reported the lowest average age in the literature in 25.8 years [24].

In our study, of the 167 patients in our study population, there were 67 women (40%) and 100 men (60%) for a sex ratio M/F of 1.49. The previous study conducted by Odzébé *et al.* at CHUB reported a sex ratio of 3.25 [6]; compared to ours there is a significant drop in the sex ratio demonstrating that the female subject is increasingly affected by lithiasis disease as reported by Abbassene *et al.* [25]. Some African authors have found a sex ratio comparable to ours, including Kaboré *et al.* in Burkina [3], Habbani *et al.* in Morocco [26].

The same is true elsewhere in the world. Lieske *et al.* in the United States [27] and Kaulanjan in the French West Indies [28] observed a sex ratio close to ours, *i.e.* 1.32 and 1.61 respectively.

All these results prove that men are mostly affected by UL than women. The influence of certain sex hormones on certain lithogenic risk factors could be the cause. Indeed, androgens seem to increase unlike estrogens which decrease the urinary excretion of calcium and oxalate, hence the formation of calcium oxalate crystals [29]. However, these results are not fixed. Indeed, we were able to observe a variation in the sex ratio according to age with a tendency to feminization at the beginning of life and then a gradual increase after 20 years until achieving a first peak between 50 - 59 years and a second beyond 70 years when the population was almost exclusively male. Some results in the literature were along the same lines as ours.

Castiglione *et al.* in Belgium reported a sex ratio of 2.25; with a tendency of sex equalization before 15 years and then a significant increase after this age, before falling in geriatric subjects [30]. The trend towards the equalization of numbers in the 2 sexes or even a feminization of UL in the population under 20 years of age could be explained by the fact that on the one hand the UL is much earlier in the female subject [31]; The jump in the sex ratio in the geriatric population would be due to the presence at these ages of mainly prostate obstacles which are an important cause of lithiasis very often affecting the lower urinary tract as reported in the literature [6]. The role of profession and educational attainment in lithiasis disease remains controversial in the literature. Our study found a proportion of 28% of patients with a lower level of education on all lithiasis patients. Possible explanations for this may include differences in diets but also the fact that subjects with a low level of education often perform more physical occupations and are therefore at risk of dehydration [32].

The proportion of patients with the socio-professional status of worker in our study was the highest at 46.7%. Recent studies have shown that LU is much less found in manual workers than in groups with sedentary occupations [29].

Low socio-economic level was associated with a high proportion of lithiasis patients.

If several authors in different parts of the globe find similar results [21], yet no explanation could be provided in particular on the biochemical and metabolic process by which psychosocial stress would become a factor responsible for the formation of urolithiasis [30]. On the other hand, Yasui *et al.* found a higher frequency of lithiasis patients in more affluent populations [33]. It has been found that they are at an increased risk of having chronic metabolic diseases through high calorie intake [32].

In our study the majority of stones were located in the upper urinary tract or 80% against 20% in the bladder. Classically, UL in developing countries was of a preferential anatomical localization in the lower urinary tract, especially at the bladder level [34]. In recent years, this localization is more common in the upper urinary tract in the literature [35].

In industrialized countries, an open surgery has become exceptional or almost non-existent given the very favorable results of the minimally invasive means of an endoscopic surgery and Extracorporeal Shock Wave Lithotripsy **(ESWL)**. Currently, surgical indications are reserved only for complex stones after the failure of Percutaneous Nephrolithotomy **(PCNL)** or laparoscopy [36] [37].

The treatment was surgical in 74.8% of cases and pharmacological in 25.2%. This would be explained by an insufficiency of the technical platform and probably the significant presence of the complex shape (the coralliform and bladder stones of a large size).

As this study is retrospective, the absence of some information did not allow looking for risk factors for urolithiasis. The same applies to the morpho-constitutional analysis of urolithiasis. However, it nevertheless provides an idea of the profile of the patient suffering from urolithiasis.

5. Conclusion

UL is a major public health problem due to its increasing prevalence. It mainly affects young adults. As in other sub-Saharan African countries, the lithogenic risk in Congo is associated with the male sex and being overweight. It is seen especially in the working population and those of a high socio-economic level. Lithiasis recurrence affects nearly one in five patients.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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