

# Epidemiology of Pediatric Urolithiasis in a Secondary Level University Hospital in Burkina Faso

Bere B<sup>1\*</sup>, Traore TM<sup>1</sup>, Kabore M<sup>1</sup>, Ouedraogo S<sup>1</sup>, Kambire JL<sup>1</sup>, Zongo PV<sup>1</sup>, Tapsoba WT<sup>2</sup>, Ouedraogo SF<sup>2</sup>, Traore Y<sup>3</sup>, Ouedraogo I<sup>2</sup>, Bandre E<sup>3</sup>, Wandaogo A<sup>2</sup>

<sup>1</sup>Regional University Hospital of Ouahigouya, Burkina Faso

<sup>2</sup>Charles de Gaulle Pediatric University Hospital Center, Burkina Faso

<sup>3</sup>Sanon Sourou University Hospital Center, Burkina Faso

## \*Corresponding author:

Bere Bernadette,  
Regional University Hospital of Ouahigouya,  
Burkina Faso, Tel: 0022671385127,  
E-mail: t\_mamadou@yahoo.fr

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Epidemiology; Urolithiasis; Pediatric; Burkina Faso

## 1. Abstract

**1.1. Introduction:** Urolithiasis has long been considered less frequent in children than in adults. However, daily clinical practice at the Regional Teaching Hospital of Ouahigouya seems to show that urolithiasis is more frequent in children than in adults. This study, the first of its kind at the Regional Teaching Hospital of Ouahigouya, aims to describe the epidemiological profile of urolithiasis in children based on hospital data.

**1.2. Material and methods:** This was a descriptive cross-sectional study over 4-year period from March 2017 to February 2021. We included all children under 15 years of age admitted to the CHUR of Ouahigouya for urinary lithiasis during the study period and having a complete medical record.

**1.3. Results:** We collected 100 cases of pediatric urolithiasis, that represented 80% (100/125) of all urolithiasis cases admitted during the study period. The hospital prevalence of pediatric urolithiasis was 10.7% (100/936). The annual incidence was 25 cases. The mean age of the children was 57.8± 41.1 months with extremes of 2 months and 168 months. The sex ratio was 13.3 (93/7) in favor of boys. Dysuria (46.3%) and bladder urinary retention (28.4%) are the main diagnostic circumstances. Bladder lithiasis accounted for 79% of all locations. Cystolithotomy was the most performed procedure in 89.6% (86/96) of cases.

**1.4. Conclusion:** This study showed a high hospital prevalence of pediatric urolithiasis in northern Burkina Faso. Contrary to developed countries, urolithiasis is more frequent in children than in adults in our context.

## 2. Introduction

Urolithiasis has long been considered less common in children compared to adults (1,2). However, recent studies, particularly in Western countries, have shown an increase in the incidence of urolithiasis in children (3-6). In children the prevalence of urolithiasis varies between 5 and 15% in developing countries against 1 to 5% in developed countries (7). In regions of the world where the socioeconomic level is low, urolithiasis mainly affects children with a predilection for the lower urinary tract (8). In North Africa, there is also an increase in the incidence of urinary lithiasis in children. This increase would be mainly linked to a westernization of lifestyles. The epidemiological profile of urolithiasis reflects the socioeconomic level of a population (8). The epidemiology of urolithiasis in children in Burkina Faso is not known despite the importance of the pathology. Indeed, daily clinical practice at the Regional University Hospital Center (CHUR) of Ouahigouya shows that urolithiasis is more common in children than in adults. A review of the literature shows that there are very few studies on urinary lithiasis in children in Burkina (9). In a study by Ouedraogo et al (9), the hospital prevalence of urolithiasis in children was 1.32%. However, Ouedraogo et al (9) did not report a clear predominance for lower urinary tract stones. What is the epidemiological profile of urolithiasis in children at the regional university hospital center (CHUR) of Ouahigouya? The present study, the first of its kind at the CHUR of Ouahigouya, aims to describe the epidemiological profile of urolithiasis in children from hospital data. We hypothesize that the hospital prevalence of urolithiasis in children is very high and that it mainly affects the lower urinary

tract. This study could contribute secondarily to providing epidemiological data for a national study. Introduction

### 3. Material and Methods

This was a descriptive cross-sectional study over a period of 4 years from March 2017 to February 2021. The study took place in the surgery department of the CHUR of Ouahigouya. We included all children under 15 admitted to the CHUR of Ouahigouya for urolithiasis during the study period and having a complete medical file. The data was collected on an individual sheet from the patients' medical records, hospitalization registers and operating reports. The variables studied were age, sex, parents' socioeconomic situation, dietary habits, residence, circumstances of discovery, location of the stone, method of extraction of the stone. Statistical analysis was performed using the Statistical Package for the Social Sciences (SPSS) software version 21.0. Figures and tables were produced using Excel 2013 software. Data confidentiality was respected.

### 4. Results

We collected 100 cases of urolithiasis in children during the study period. The hospital prevalence of urolithiasis in children was 10.7% (100/936). The annual incidence was 25 cases. Pediatric urolithiasis accounted for 80% (100/125) of all cases of urolithiasis admitted during the study period. The average age of the children was  $57.8 \pm 41.1$  months with extremes of 2 months and 168 months. The age group from 0 to 60 months was the most represented, i.e. 68% (68/100) of cases. Fourteen of our patients were infants (age < 2 years). (Figure 1) gives the distribution of patients

according to age groups. The sex ratio was 13.3 (93/7) in favor of boys. The ethnic group was specified in 98 patients. The two ethnic groups represented were the Mossé and the Fulani respectively in 76.5% (75/98) and 22.4% (22/98) of the cases. The months of March and April recorded the highest number of cases of urolithiasis (Figure 2). A history of repeated urinary tract infections was noted in 11 patients, i.e. 11% of cases. A notion of consanguinity was noted in 04 cases or 4% of cases. Dysuria (46.3%) and bladder retention of urine (28.4%) are the main diagnostic circumstances followed by urinary tract infection (16.8%). (Table 1) gives the distribution of patients according to the circumstances of discovery. The lithiasis of the lower urinary tract represented 95% (95/100) against 5% (5/100) for the upper urinary tract. Bladder stones accounted for 79% of all locations. (Table 2) gives the distribution of patients according to the location of the urolithiasis. The average consultation time was  $84.9 \pm 121.1$  days with extremes of 1 day and 365 days. Ultrasound of the urinary tree was performed in all patients. The size of the stone was specified in 52 cases. The average size was  $19.5 \pm 9.4$  mm with extremes of 5 mm and 40 mm. Spontaneous expulsion was noted in 4% (4/100) of cases. It was bladder lithiasis in 2 cases, one case of urethral lithiasis and one case of ureteral lithiasis. Cystolithotomy was the most performed intervention in 89.6 (86/96) of cases. (Table 3) gives the distribution of patients according to the procedures performed. Post-operative follow-up was simple in 91.7% (88/96) of cases. Eight patients (8.3%) presented a complication such as vesicocutaneous fistula. The average duration of hospitalization was  $7.3 \pm 8.4$  days with extremes of 2 days and 45 days.

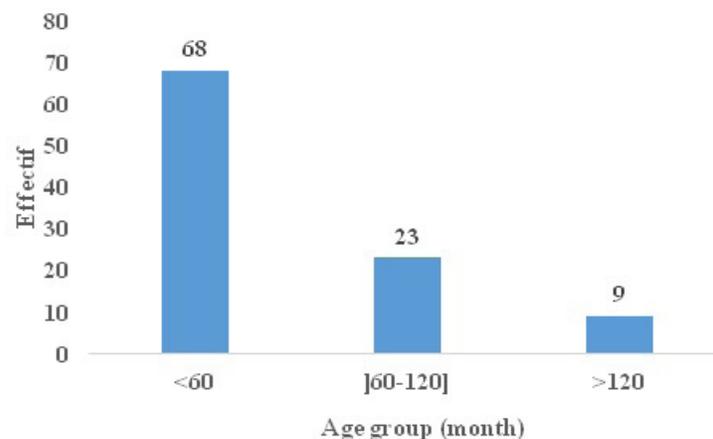
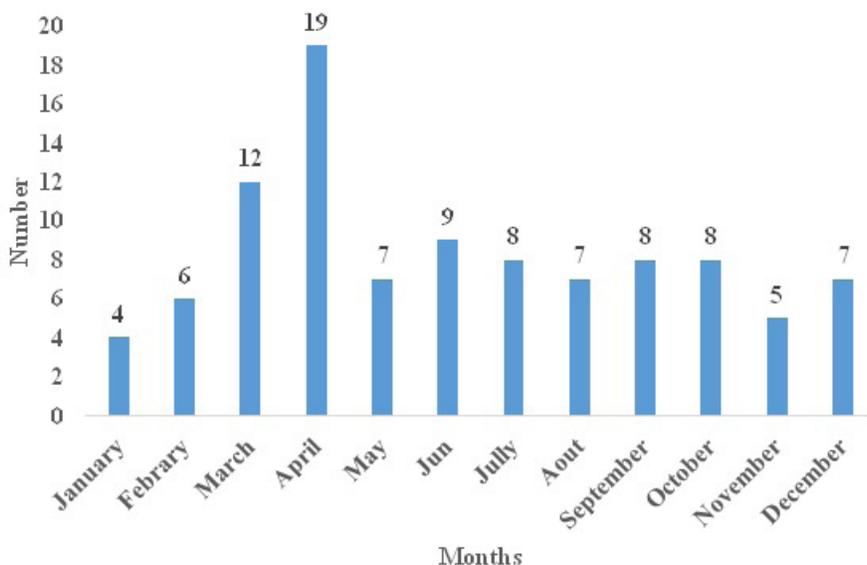


Figure 1 : Distribution of patients by age group (n=100)



**Figure 2:** Monthly distribution of cases of urolithiasis in children (n=100)

**Table 1:** Distribution of patients according to the circumstances of discovery (n=95) Circumstances of discovery Number Percentage (%)

Circumstances of Discovery	Number	Percentage (%)
Bladder retention of urine	27	28,4
Dysuria	44	46,3
Urinary infections	16	16,8
Abdominal pain	5	5,3
Gross Hematuria	2	2,1
Chance find	1	1,1
Total	95	100

**Table 2:** Distribution according to the location of the lithiasis (n=100)

Location of lithiasis	Number	Percentage (%)
bladder	79	79
Urethral	16	16
Ureteral	3	3
pyelic	2	2
Total	100	100

**Table 3:** Distribution of patients according to procedures performed (n=96)

Interventions carried out	Number	Percentage (%)
Cystolithotomy	77	80,2
Repression and cystolithotomy	9	9,4
Pyelolithotomy	2	2,1
Ureterolithotomy	2	2,1
	3	3,1
Urethlothotomy	3	3,1
Total	96	100

## 5. Discussion

The objective of this study was to describe the epidemiological profile of urolithiasis in children at the CHUR of Ouahigouya. The study showed a high hospital prevalence (10.7%) of urolithiasis in children. This prevalence is eight times higher than that (1.32%) reported by Ouédraogo et al (9) in a study carried out at the Charles de Gaulle Pediatric University Hospital in Ouagadougou. However, the prevalence in the present series is in agreement with the data in the literature. Indeed, the prevalence of urolithiasis in children is estimated between 5 and 15% in developing countries (10). This series shows a clear predominance of urolithiasis in children compared to that in adults. Indeed, urolithiasis in children accounted for 80% of all cases of urolithiasis in the present series. This finding confirms the literature data. In fact, in regions with a low socioeconomic level, urolithiasis mainly affects children, while in industrialized countries it is adults who are most affected (8). The annual incidence of childhood urolithiasis was 25 cases in the present series. Authors like Ouédraogo et al (9), Jellouli et al (11) in Tunisia and El Lekhlifi et al (12) in Morocco respectively reported an annual incidence of 13.4; 3.37 and 3.58 cases per year. These results show great variability in the incidence of urolithiasis in children depending on the region. They also show that the incidence is very high in our context. The difference in terms of incidence between the present series and that of Ouédraogo et al (9) may be linked to the socioeconomic level. Indeed, the study by Ouédraogo et al (9) took place in the center of the country in the capital where the socioeconomic level is higher compared to the northern region of the country where the CHUR of Ouahigouya is located. The average age of the children in the present series was 57.8 months. This result is comparable to that of Mahamat et al (13) in Chad who reported an average age of 63 months. The age group from 0 to 60 months was the most represented (68%) in this series. Indeed, most studies show that urolithiasis in children is more common before the age of 60 months (13-16).

The present series confirms the clear male predominance (sex-ratio=13.3) reported in the literature (13-17). Indeed in children, boys are more prone to develop urinary stones in the first decade while girls are in the second decade. This would be linked to hormonal differences in the two sexes (18). This present series shows a predominance of lithiasis of the lower urinary tract in children. This result confirms the predominance of lower urinary tract stones in children in developing countries (7). Bladder stones accounted for 79% of all locations in the present series. Ouédraogo et al (9) and Mahamat et al (13) respectively reported a proportion of 49.25% and 95.58% for bladder stones. Bladder lithiasis remains endemic in regions of the world with low socioeconomic status

such as Africa (2). These regions are part of a belt known as the Afro-Asian belt of bladder stones (2,19). Bladder lithiasis is considered endemic when it occurs without any infection, obstruction or neurological bladder (20). These types of lithiasis are prevalent in regions where children suffer from malnutrition, chronic diarrhea with its corollaries of dehydration (20). According to the World Health Organization (WHO), the prevalence of chronic malnutrition in children is 29.5% in the northern region of Burkina Faso (21).

However, a reversal of the trend has been observed in several regions due to the improvement in living conditions. Thus Dibi et al (22) in Morocco and Marrakchi et al (23) in Tunisia reported a predominance of lithiasis of the upper urinary tract. It must be said that the westernization of the lifestyle in North Africa has made it possible to reverse the trend in the epidemiology of urolithiasis (24). Burkina Faso is not part of the Afro-Asian belt of endemic bladder stones (20). However, the northern region of Burkina Faso borders Mali and Niger, which are located in this belt of bladder stones. It is a hot and arid region with very high temperatures. The annual average can often reach 39° Celsius. The prevalence of urolithiasis is very high in hot climate regions (25,26). The months of March and April recorded the highest number of cases of urolithiasis in the present series. This corresponds to the hottest time of the year. This hot climate associated with a low consumption of drinking water, especially in children, increases the risk of formation of urinary stones. According to the National Institute of Statistics and Demography of Burkina Faso, the North region holds the national poverty record with 70.4% of the population living below the national poverty line (27). It is a predominantly agricultural population with very often a diet mainly made of cereals and poor in vitamins (28). The consumption of dairy products is also a lithogenic factor in our context. A history of recurrent urinary tract infections was noted in 11 patients. A notion of consanguinity was found in 4% of cases. Dibi et al (22) in Morocco and Ali et al (16) in Iraq found inbreeding in 14% and 72% of cases respectively. Clinically, bladder retention of urine (28.4%) and dysuria (46.3%) were the main diagnostic circumstances in our series. This is related to the predominance of the localization of stones in the lower urinary tract. This result is comparable to that of Mahamat et al. In fact, in their series, dysuria and urinary bladder retention were the main clinical signs found (13). As for abdominal pain, it is not typical in children. None of our children had renal colic pain. This study has some limitations. Indeed, the morphoconstitutional analysis of stones was not performed in this study. The etiological investigation is insufficient. This is partly linked to the inadequacy of the technical platform.

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