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### Stones and Endourology

Original article

# Epidemiological characteristics of childhood urolithiasis in Morocco



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#### KEYWORDS

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#### Abstract

**Objectives:** Due to the increase observed in the incidence of pediatric urolithiasis in the world, and the scarcity of studies of this pathology in Morocco, we assessed whether epidemiological characteristics of pediatric urolithiasis have a similar profile like in developed countries further we tried to assess the prevalence of this pathology among children in Hassan II University-Hospital of Fez.

**Subjects and methods:** Between January 2003 to November 2013, 104 pediatric patients with urolithiasis were presented to Hassan II University-Hospital of Fez. Eighty one were boys and 23 girls. Patients were referred from different regions of Moroccan states.

**Results:** Out of 104 children diagnosed with urolithiasis, 5 patients with positive family history of renal stones, and 12 were recurrent (12%).

Their age varied between 8 months and 15 years old, with a mean age of  $7.86 \pm 4$ . The sex ratio was 3.5:1 boys to girls. Clinical presentations were dominated by micturition disorder (59%), abdominal or flank pain (28%), nephritic colic (22%), hematuria (22%) and urinary tract infection (13%). Stones were located in the upper urinary tract in 62.5% of cases.

Stones were treated by surgery in 89 cases (89%), and with ESWL in only 2 cases (2%).

Over these years of study, a prevalence of 0.83% of childhood urolithiasis was calculated.

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**Conclusions:** This preliminary study represents only a region of the country, so more epidemiological analyses should be done.

Stone analysis should be performed more frequently, and patients must be presented at earlier stages, before any development of renal failure.

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## Introduction

Urinary stone disease affects patients of all ages but remains rare in children [1]. The composition and clinical characteristics of urinary calculi in children varies greatly from one country to another and from one historic period to the next, depending on several factors such as dietary, climate, genetic and socio-economic factors [2,3].

In Morocco, stone prevalence, incidence and risk factors for hospitalization occur less in children compared to adults.

The aim of this study was to identify trends in the epidemiology of urolithiasis during an 11-year period among children at Pediatric and Pediatric surgery departments of Hassan II University-Hospital of Fez.

## Subjects and methods

From January 2003 to November 2013, 104 pediatric patients with urolithiasis were treated in Hassan II University-Hospitals of Fez. Patients were referred from different regions of Moroccan state. Medical records were evaluated for clinical and laboratory data including age of diagnosis, sex, personal, family history, clinical presentations, location of stones and method of treatments.

Statistical analysis were performed with SPSS software version 21, with a significance value set at  $P < 0.05$ .

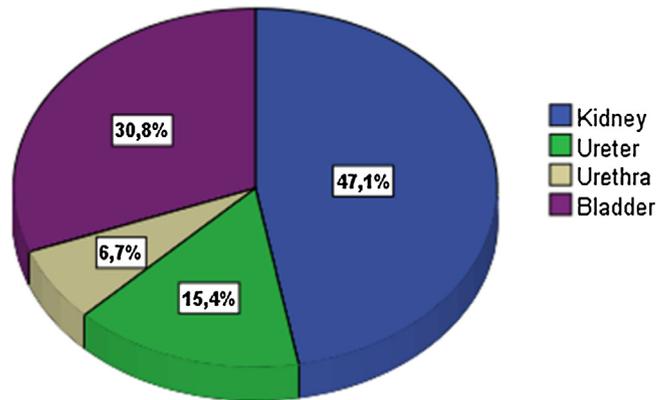
## Results

The age of pediatric urolithiasis patients at diagnosis ranged from 8 months to 15 years old with an average of  $7.86 \pm 4$  years (Mean  $\pm$  SD). 81 were boys and 23 girls, while the sex ratio was 3.5:1 boys to girls.

Over these 11 years, a prevalence of 0.83% of childhood urolithiasis was calculated.

Out of the 104 children diagnosed with urolithiasis disease, 68% of patients come from rural areas, 5 of those children have a positive family history of urolithiasis, and 12 cases were recurrent (12%).

Clinical presentations of this pathology were variable and multiple in some cases. They were dominated by micturition disorder (59%), abdominal or flank pain (28%) and nephritic colic 22%. Hematuria and urinary tract infection as clinical presentations of stone formation were found respectively in 22% and 13% of our patients. Anatomical abnormalities were detected in 4 patients, and only in one of these patients, urolithiasis was detected incidentally.



**Fig. 1** Location stones in urinary track.

Stones were located in the upper urinary tract among 62.5% of cases (kidney: 47.1%, ureter: 15.4%), and were mostly found in children over 5 years old, and in the lower tract in 37.5% cases (bladder: 30.8%; urethra: 6.7%) (Fig. 1).

Ultrasound examinations revealed that unilateral stones occur in 87.5% of patients (42.9 right; 44.6 left) and bilateral ones in 12.5% of all cases.

The stone sizes were also determined by echography and scanner varied between 4 and 40 mm (Fig. 2).

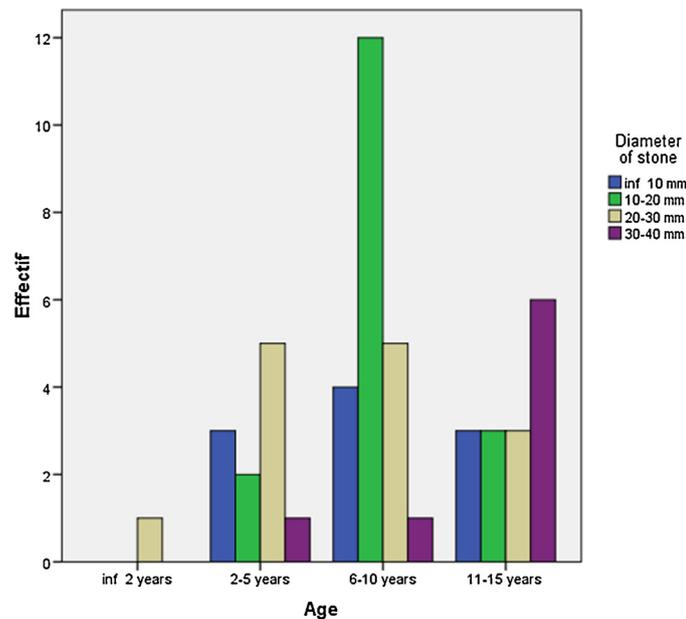
At the time of diagnosis, 19 patients (18.3%) had positive urine cultures; *E. coli* was the most commonly encountered microorganism. It represents 47.4% of species. *P. mirabilis*, *P. aeruginosa* and Enterobacter genus represented 10.5%.

Stones were analyzed only in 16 patients (15.4%), 62.5% of cases by chemical methods and 37.5% of cases by infrared spectrophotometry.

Calcium oxalate stones were present in 56.25% of cases, phosphate in 50% of stones in which struvite represented 18.75% of cases. Uric acid was present in 12.5% of stones.

Our data revealed that (6.7%) cases of chronic renal failures are the result of urinary stone disease.

Because of the absence of other less invasive techniques in Hassan II hospital, surgery is considered to be the only technique of extracting urinary calculi from children. It represents 89 cases, and 2 cases of ESWL in our series were performed in the pediatric hospital of Rabat. The stones passed spontaneously in 4.4% of cases.



**Fig. 2** The stone sizes in function of age.

## Discussion

While considered to be rare in children, several studies suggest that urolithiasis is becoming more common in pediatric patients [4] and it remains a common health problem in some parts of the world, such as Turkey [5], Pakistan, and Afghanistan [6,7].

The prevalence of urolithiasis varies according to geographic areas and risk factors [8].

More recent reports suggest that urinary calculi are being recognized with an increasing frequency [9,10].

In Morocco, unlike in adult patients, epidemiological studies in children are fewer [11,12].

In our data, a prevalence of 0.83% of childhood urolithiasis was calculated, which is less than the prevalence in the United States which was estimated to be 5.2% [13], whereas prevalence in a Turkish population under the age of 14 was 17% [14]. Annual incidence has been estimated to be 1.8 per 100,000 children per year in Kuwait [15].

A male predominance was confirmed with a sex ratio of 3.5. This ratio is comparable to that given by Oussama et al. [11] in Middle Atlas and is higher than the one observed in France [16].

In our study 62.5% of stones were located in the upper urinary tract. This result was consistent with the results of recent studies in developed countries [17,18].

According to the literature, the presenting signs and symptoms of pediatric stone disease are different from those in adults [19]. They have varied presentations including nonspecific pain located in the abdomen, flank, or pelvis which may be confused with colic pain. In this study, those symptoms were present in 38.75% of patients. This value is higher than that of Turkish study [20]; and these symptoms were most commonly presented in Children having more than 5 years old [21,22].

Macroscopic or microscopic hematuria can occur in up to 90% of children with urolithiasis [23]. In our series, it represented 28.75% of symptoms.

Urethral and urethral stones can cause obstruction that leads to pain [24,25], we showed that urinary obstruction was present in 17.5% of patients.

A total of 5% of children had associated anatomical abnormalities of urinary tract, whereas in a Turkish study [20] they were present in 8.9% of children.

Unfortunately, and same as other studies, only 15.4% of stones were analyzed, which limits our ability to confirm the predominant composition. The unavailability of specialized laboratories for this analysis (except in Rabat) and the high analysis cost are among the main constraints.

In the future, this analysis should be routinely performed.

Unlike the developed countries where traditional surgery was replaced several years ago with non-invasive techniques, our study revealed that the open surgery remains the most frequently used treatment of urolithiasis in children. This is due to the inadequacy of the ESWL in Hassan II University-Hospital center to the size of the children. The same problems are mentioned by other studies carried out in Morocco [12,26].

## Conclusion

The present study has provided important information on the epidemiologic and clinical aspects of pediatric urolithiasis. Additional studies are needed to determine the etiological aspect of pediatric urolithiasis. All children with abdominal pain, macroscopic hematuria or UTI should be examined thoroughly for urolithiasis. Early detection and prophylactic treatment of urolithiasis are important to avoid the risk of permanent renal damage.

The epidemiological characteristics of urolithiasis in the Moroccan child are similar to those reported in industrialized countries, despite the more widespread bladder stones reflecting the slower growth in living standards in Morocco.

#### Ethical committee approval

This study obtained the approval of the ethical committee of the Faculty of Medicine and Pharmacy and the CHU Hassan II of Fez (Ref. 07/15).

#### Conflict of interest

The other authors have no conflicts of interest to disclose.

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#### Authors contributor

Zineb El lekhlifi directed the work and drafted the initial manuscript.

Professor Laziri proposed and designed the study.

Professor Youssef Bouabdillah and Mustapha Hida authorized and supervised data collection in their services.

Fatima Zahrae Souilmi reviewed and criticized the manuscript.

Mustapha Samih: statistical analysis.

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#### References

- [1] Walther C, Lamm D, Kaplan GW. Paediatric urolithiasis: a ten year review. *Paediatrics* 1990;65:1068–72.
- [2] Nivet H. Lithiase urinaire de l'enfant. *EncyclMéd-Chir* (Elsevier, Paris) 1986;18104-I10:1–6.
- [3] Leroy B, Bensman A. Lithiase urinaire de l'enfant. *Gazette Méd* 1991;98(9):29–36.
- [4] Worth T. Kidney stones in children on the rise. *Los Angeles Times* 2009 <http://articles.latimes.com/2009/may/25/health/he-kidney25/3>.
- [5] Tekin A, Tekgul S, Atsu N, Sahin A, Ozen H, Bakkaloglu M. A study of the etiology of idiopathic calcium urolithiasis in children: hypocitruria is the most important risk factor. *J Urol* 2000;164(1):162–5.
- [6] Rizvi SA, Naqvi SA, Hussain Z, Shahjehan S. Renal stones in children in Pakistan. *Br J Urol* 1985;57:618–21.
- [7] Srivastava RN, Hussain MA, Goel RG, Rose GA. Bladder stone disease in children in Afghanistan. *Br J Urol* 1986;58:374–7.
- [8] Soucie JM, Coates RJ, McClellan W, Austin H, Thun M. Relation between geographic variability in kidney stones prevalence and risk factors for stones. *Am J Epidemiol* 1996;143:487–95.
- [9] Rule AD, Bergstralh EJ, Melton III LJ, Li X, Weaver AL, Lieske JC. Kidney stones and the risk for chronic kidney disease. *Clin J Am Soc Nephrol* 2009;4:804–11.
- [10] Lotan Y. Economics and cost of care of stone disease. *Adv Chronic Kidney Dis* 2009;16:5–10.
- [11] Oussama A, Kzaiber F, Mernari B, Semmoud A, Daudon M. Analyse de la lithiase de l'enfant dans le moyen Atlas Marocain par spectrométrie infrarouge. *Ann Urol* 2000;34:384–90.
- [12] Dibi A, Jabourik F, Abouhafis A, Kissra M, Benhmamouch MN, Bentahila A. Les lithiases urinaires chez l'enfant. *J Pédiatr Pueric* 2012;25:91–6.
- [13] Stamatelou KK, Francis ME, Jones CA, Nyberg LM, Curhan GC. Time trends in reported prevalence of kidney stones in the United States: 1976–1994. *Kidney Int* 2003;63(5):1817–23.
- [14] Tellaloglu S, Ander H. Stones in children. *Turk J Pédiatr* 1984;26:51–60.
- [15] Al-Eisa AA, Al-Hunayyan A, Gupta R. Pediatric urolithiasis in Kuwait. *Int Urol Nephrol* 2002;33:3e6.
- [16] Daudon M. L'analyse morphoconstitutionnelle des calculs dans le diagnostic étiologique d'une lithiase urinaire de l'enfant. *Arch Pédiatr* 2000;7:855–65.
- [17] Coward RJ, Peters CJ, Duffy PG, Corry D, Kellett MJ, Choong S, et al. Epidemiology of paediatric renal stone disease in the UK. *Arch Dis Child* 2003;88:962–5 [Erratum, *Arch Dis Child* 2004;89:797].
- [18] Palmer JS, Donaher ER, O'Riordan MA, Dell KM. Diagnosis of pediatric urolithiasis: role of ultrasound and computerized tomography. *J Urol* 2005;174:1413–6.
- [19] Faerber GJ. Pediatric urolithiasis. *Curr Opin Urol* 2001;11(4):385–9.
- [20] Alpay H, Ozen A, Gokce I, Biyikli N. Clinical and metabolic features of urolithiasis and microlithiasis in children. *Pediatr Nephrol* 2009;24(11):2203–9.
- [21] Sas DJ. An update on the changing epidemiology and metabolic risk factors in pediatric kidney stone disease. *Clin J Am Soc Nephrol* 2011;6:2062e8.
- [22] Daudon M, Jungers P, Traxer O. Lithiase rénale: diagnostic et traitement. Paris: Flammarion Médecine-Publications; 2012. p. 541.
- [23] Bartosh SM. Medical management of pediatric stone disease. *Urol Clin N Am* 2004;31:575–87.
- [24] Hollingsworth JM, Rogers MA, Kaufman SR, Bradford TJ, Saint S, Wei JT, et al. Medical therapy to facilitate urinary stone passage: a meta-analysis. *Lancet* 2006;368(9542):1171–9.
- [25] Inglis JA, Tolley DA. Ureteroscopic pyelolysis for pelviureteric junction obstruction. *Br J Urol* 1986;58(2–4):250–2.
- [26] El Lekhlifi Z, Laziri F, Boumzaoued H, Maouloua M, Louktibi M. Étude épidémiologique rétrospective sur la lithiase urinaire chez l'enfant dans la région de Meknès au Maroc (2000–2012). *J Pédiatr Pueric* 2013. <http://dx.doi.org/10.1016/j.jpp.2013.10.003>.