

# Bladder stone disease in children: clinical study in Aden, Yemen

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## Abstract

**Background:** Bladder stones in children continue to be a serious public health problem in the Middle East.

The aim was to determine the patients' characteristics and some aspects of clinical findings in the affected children.

**Materials and method:** This was a retrospective study of all children with bladder stones seen and treated at Alsaidi private hospital in Aden, during the period January 2016 to December 2017.

**Results:** A total of 62 children were diagnosed with bladder stone and (83.9%) were males and (16.1%) females. Their age ranged between 1 to 12 years. The age group 1 to 6 years represented the highest percentage of patients (53.2%)

Most patients were from rural areas (69.4%). The ratio male to female was 5.2:1 and the mean age of all patients was  $6.3 \pm 3.5$  years (age range between 1 to 12 years). The mean size of stones was  $14.8 \pm 3.9$  mm (stone size range 8 – 20 mm).

The symptoms were dysuria (40.3%), urine retention (32.3%), and hematuria (27.4%). Urinary tract infection was in (24.2%) patients. The treatment procedures were (53.2%) managed by cystolitholapaxy followed by cystolithotomy (46.8%).

The relationship between bladder stone size groups and the treatment procedures was statistically significant ( $p = 0.000$ ).

**Conclusion:** The majority of affected children were males and were from rural areas. Also, the majority were less than 6 years old. The treatment procedures were cystolitholapaxy followed by cystolithotomy.

**Key words:** Bladder stone, children, Aden, Yemen

## Introduction

The oldest bladder stone found by archaeologists' - dates back to 4800 BC in Egypt [1]. Currently, bladder calculi are uncommon cause of pediatric illness in Western nations. Bladder calculi remain common in less developed countries [2].

Urinary calculi can be broadly divided into two types, namely upper urinary tract calculi and lower urinary tract calculi. Bladder calculi are the most common lower urinary tract calculi [3].

Bladder calculi account for 5% of urolithiasis and usually result from the diet, foreign bodies, bladder outlet obstruction, or urinary tract infection [3].

Bladder calculi can be classified into the following two types: primary bladder calculi and secondary bladder calculi [4].

Primary bladder calculi are more common in children exposed to low-protein or low-phosphate diets. Primary bladder calculi have a low recurrence rate following completion of treatment [5].

The following four causes may lead to secondary bladder calculi formation: (i) bladder outlet obstruction, (ii) intravesical foreign bodies, (iii) neurogenic bladder and spinal cord injury, and (iv) renal transplant [4].

Bladder calculi in children in the absence of obstruction, infection or neurogenic disease are considered to be endemic [6].

However, bladder calculi continues to be a serious public health problem in resource poor settings notably in the Middle East, Africa and South East Asia the so called Afro-Asian stone belt [7,8].

The symptoms and findings in children with bladder stones are usually urgency, frequency, incontinence, dysuria, pyuria, difficulty voiding, small caliber of urinary stream, lower abdominal pain and urinary intermittency, with fever reported in about 20-50% of these children [9]. Additionally macroscopic hematuria in children with bladder stones has been noted in 33-90% of patients [10,11]. Most bladder stones are composed of calcium oxalate (45-65%), followed by calcium phosphate (14-30%), and they are usually larger than 2.5 cm in diameter [12,13].

The aim of this study was to determine the patients' characteristics and some aspects of clinical findings in children with bladder stone disease.

## Materials and method

This was a retrospective study of all children who suffer from bladder stones and who were seen and treated at Alsaidi private hospital in Aden over a two-years-period, from January 2016 to December 2017. During this period, a total of 62 patients were found with this health problem. The patients' charts were retrieved and information was obtained about sex, age, residency, family history, size of stone, symptoms, urinary tract infection and treatment procedures.

The data was entered into a computer and analyzed using SPSS version 17, statistical package. For variables difference, chi-square tests, means and P values were calculated, with differences at the level less than 5% regarded as significant.

## Results

In the study years 2016 to 2017, a total of 62 children were diagnosed with bladder stone disease according to their medical records. Table 1 and Figure 1 revealed that males were 52 (83.9%) and females 10 (16.1%).

The age of patients ranged between 1 to 12 years.

The age group 1 to 6 years represents the highest percentage of patients 33 (53.2%) while the age group 7 to 12 years was 29 (46.8%).

Most of patients were from rural areas 43 (69.4%). Family history of urinary stones was found in 10 (16.1%).

**Table 1: Characteristics of the study patients (n=62)**

Variables	No	(%)
<b>Sex:</b>		
Males	52	(83.9)
Females	10	(16.1)
<b>Age group (years):</b>		
1 – 6	33	(53.2)
7 – 12	29	(46.8)
<b>Residency:</b>		
Rural	43	(69.4)
Urban	19	(30.6)
<b>Family history:</b>		
Yes	10	(16.1)
No	52	(83.9)

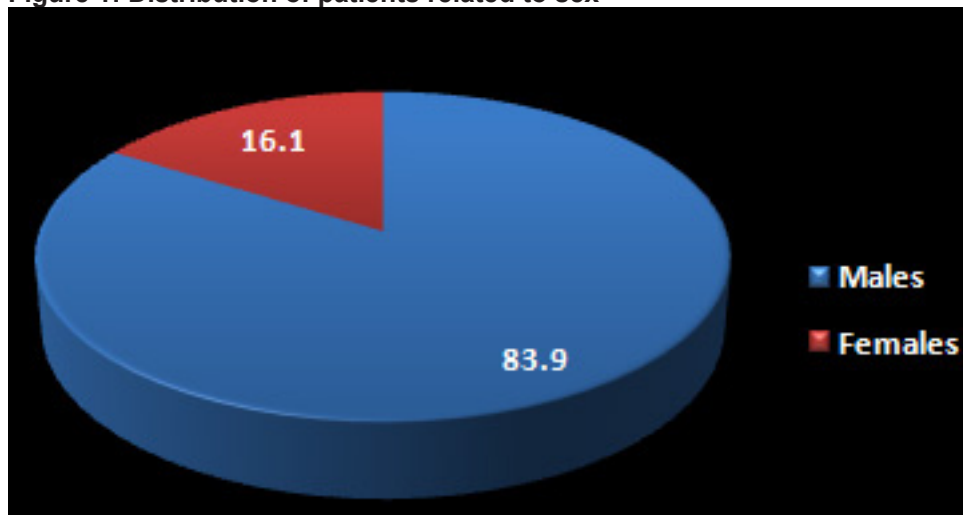
**Figure 1: Distribution of patients related to sex**

Table 2 showed the ratio male to female was 5.2:1. The mean age of all patients was  $6.3 \pm 3.5$  years. The mean age of males was  $6.4 \pm 3.5$  years and the mean age of the female patients was  $5.7 \pm 3.4$  years. There is no association between means ( $p > 0.05$ ). The age of all patients ranged between 1 to 12 years. The mean size of stones was  $14.8 \pm 3.9$  mm and the stone size range was 8 – 20 mm. There is no association between means of stone sizes ( $p > 0.05$ ).

**Table 2: Distribution of mean age & mean size of bladder stones related to sex**

Characteristic	Range	Ratio	Mean $\pm$ SD	p- value
Ratio male to female		5.2 : 1		
<b>Mean age (years)</b>				
Males			$6.4 \pm 3.5$	$P >$
Females			$5.7 \pm 3.4$	0.05
Total			$6.3 \pm 3.5$	
<b>Age range (years):</b>	1 – 12			
<b>Mean size of stones (mm):</b>				
In males			$14.4 \pm 4.0$	$P >$
In females			$16.9 \pm 2.0$	0.05
Total			$14.8 \pm 3.9$	
<b>Range of stone size (mm):</b>	8 – 20			

Table 3 revealed that the symptoms were dysuria in 25 patients (40.3%), followed by urine retention in 20 (32.3%), and hematuria in 17 patients (27.4%).

The sizes of stones were put into two groups. Group 8 – 13 mm was 22 (35.5%) while group 14 – 20 mm was 40 (64.5%). Fifteen (24.2%) were found with urinary tract infection. Thirty three (53.2%) of the patients admitted with bladder stone were managed by cystolitholapaxy followed by cystolithotomy 29 (46.8%) as shown in Table 3.

**Table 3: Clinical characteristics and management (n=62)**

Variables	No	(%)
<b>Symptoms:</b>		
Dysuria	25	(40.3)
Urine retention	20	(32.3)
Hematuria	17	(27.4)
<b>Size group (mm):</b>		
8 - 13	22	(35.5)
14 - 20	40	(64.5)
<b>Urinary Tract Infection:</b>		
Yes	15	(24.2)
No	47	(75.8)
<b>Treatment:</b>		
Cystolitholapaxy	33	(53.2)
Cystolithotomy	29	(46.8)

The relationship between bladder stone size groups and the treatment procedures was statistically significant ( $p = 0.000$ ) while the difference between values of symptoms and treatment procedures was not significant ( $p > 0.05$ ) as shown in Table 4.

**Table 4: Relationship between treatment and clinical findings (n=62)**

Variables	Treatment type				p-value
	Cystolithotomy		Cystolitholapaxy		
	No	(%)	No	(%)	
<b>Stone size group (mm):</b>					
8 – 13	0	(0.0)	22	(35.5)	$p=0.000$
14 – 20	29	(46.8)	11	(17.7)	
<b>Symptoms:</b>					
Dysuria	10	(16.1)	15	(24.2)	$P > 0.05$
Urine retention	12	(19.4)	8	(12.9)	
Hematuria	7	(11.3)	10	(16.1)	

## Discussion

Bladder stones in developing nations are more commonly endemic in children because of dehydration, infection and a low-protein diet. Calcium-based stones in Western countries are relatively rare in the upper tract [14]. Bladder stones are usually rounded and may occur as singles or multiples. They can be small, or can be large enough to occupy the entire bladder. Bladder stones reach up to 5 cm in diameter in some parts of Asia [15].

In the present study we found 62 children were diagnosed with bladder stone disease and males were significantly more affected than females; they were 52 (83.9%) males and 10 (16.1%) females with the ratio male to female 5.2:1.

In a study that was conducted in Pakistan [16], males were more affected than female children. In their study, out of 113 children with bladder stones males were 97 (85.8%) and females were 16 (14.15%) with M: F ratio of 6:1.

Huffman et al [17] reported that childhood bladder stones are more common in boys than girls.

Our findings correlate well with Huffman et al [17] and Lal et al [16] that in areas of endemic bladder stones boys are affected more than girls.

In our study the age group 1 to 6 years represents the highest percentage of children (53.2%) with childhood bladder stones.

Lal [16] reported that in their study 67% of children affected with bladder stones were less than 5 year of age.

We found in our study that most of the patients are from rural areas (69.4%).

Husain M et al [18] reported in their study that the geographical distribution of paediatric bladder stone is in a transition phase in this country. The children from affluent areas of the city have decreased incidence but disease continues to be endemic in rural areas of the country and poor localities of big cities. Lal et al [16] reported in their

study that 98% of children are from rural populations of poor socioeconomic group and 2% from urban cities/town's population of Tharparker, Pakistan.

Bladder stones are still prevalent in children living in poor or rural regions [19,20,21].

Our study showed that positive family history of urinary stones was found in 10(16.1%).

Positive family history has been reported to be present in 17–37% of patients with stone disease when compared with 4–22% of normal healthy control subjects [22]. In a well-designed epidemiological study, about 25% of patients with urinary stones were found to be associated with a positive family history [23]. In another study, it was demonstrated that stone-forming patients with positive family history were affected by the disease at younger ages [24].

In the present study, common symptoms at presentation were dysuria in 25 patients (40.3%), followed by urine retention in 20 patients (32.3%), and hematuria in 17 patients (27.4%). These findings are comparable to other similar studies in the literature [25,26,27].

In our study the mean age of all patients was 6.3±3.5 years. The mean age of males was 6.4±3.5 years and the mean age of the female patients was 5.7±3.4 years. There is no association between means ( $p > 0.05$ ). The age of all patients ranged between 1 to 12 years.

Lal et al [16] reported in their study that the age of their study children ranged from 18 months to 14 years which is more than ours also, with the mean age 8.6±4.9 years higher than our study patients' mean age.

Similar to our findings Ali et al [25] reported in their study that out of 120 patients, 90 (75%) were males and 30 (25%) were females. The mean age of the patients was 6.2±2.03 years, with age ranging from 3-13 years.

In the current study we found the mean size of the stones was 14.8±3.9 mm and the stone size range was 8–20 mm.

Also, we found that the bladder stones of the group size 14–20 mm represented the higher percentage (64.5%).

This is comparable to what Ali et al [25] reported, that the mean stone size on ultrasonography was 14.1±3.30 mm, with size ranging from 6-22 mm.

In the present study we found (53.2%) of the patients admitted with bladder stone were managed by cystolitholapaxy followed by cystolithotomy (46.8%). Cystolitholapaxy and lithotripsy have now become the gold standards for the treatment of bladder stones. Most published studies have used a holmium laser, electrohydraulic lithotripter, and Litho Clast technology for the treatment of all types of bladder stones in both the adult and pediatric populations [28].

Open cystolithotomy was previously the gold standard before the introduction of endoscopic technology for the treatment of bladder stones in pediatric patients for a long time offering excellent success rates [28]. Abarchi et al [29] obtained 100% of patients free of calculi in a series of 70 children with bladder stones.

The development of smaller equipment, associated with increased experience of endourologists with minimally invasive procedures, has led to more endoscopic approaches to bladder stones in pediatric patients. If in adults there are no good prospective studies, in children the situation is no different [30].

Salah et al [31] percutaneously approached 155 children younger than 14 years old with calculi measuring between 7 and 40 mm (mean 23 mm). All patients were free of calculi without major complications.

Al-Marhoon et al [32] compared endourologic procedures with open cystolithotomy in children with an average age of five (2-15 years) and bladder calculus of average size 2.8 cm (0.7 to 5.0 cm). Fifty-three patients were treated by open cystolithotomy and 54 patients by transurethral or percutaneous access.

Yu et al [33] reported that in Taiwan, only 5% of inpatients with urolithiasis underwent open surgery for lithotomy. Transurethral cystolitholapaxy and lithotripsy have now become the gold standards for the treatment of bladder stones.

We found in our study that the relationship between bladder stone size groups and the treatment procedures was statistically significant ( $p = 0.000$ ) while the difference between values of symptoms and treatment procedures was not significant ( $p > 0.05$ ).

## Conclusion

We concluded that childhood bladder stones represented a public health problem in Yemen. The majority of affected children were males and were from rural areas. Also, the majority of them were less than 6 years old.

Most affected patients had bladder stone sizes more than 14 mm. The treatment procedures were cystolitholapaxy followed by cystolithotomy.



## References

1. Ellis H: A History of Bladder Stones. Oxford, England, Blackwell Scientific Publications, 1969.
2. Huffman JL, Ginsberg DA: Calculi in the bladder and urinary diversions. In: *Kidney Stones: Medical and Surgical Management*, pp 1025–33. Edited by Coe FL, Favus MJ, Pak CY, Parks JH, Preminger GM. Philadelphia, PA, Lippincott-Raven, 1996.
3. Schwartz BF, Stoller ML. The vesical calculus. *Urol Clin North Am.* 2000; 27: 333-46.
4. Benway BM, Bhayan SB. Lower urinary tract calculi. In: Wein AJ, Kavoussi LR, Partin AW, Peters CA, editors. *Campbell-Walsh Urology*. 11th ed., Ch. 55. Philadelphia: Elsevier; 2016. p. 1292-3
5. Huang WY, Chen YF, Chen SC, Lee YJ, Lan CF, Huang KH, et al. Pediatric urolithiasis in Taiwan: A nationwide study, 1997-2006. *Urology* 2012;79:1355-9
6. Degnari RA, Jalbani MH, Abro MA. Transurethral cystolithotripsy for bladder calculi in children. *Med Channel.* 2009; 5(4):110-113
7. Koko J, M' Ba- Meyo J, Remond-Yeni A, Llana-White C Gahouma D. Bladder stones in children in Gadon. Three case reports. *Ann Urol* 1996; 5:247–50
8. Rabasse N, Lithiases urinaires au Laos. Vannes, France: Editions S. EG.I.P, 1998.
9. Chow KS, Chou CY. A Boy with a Large Bladder Stone. *Pediatr Neonatol.* 2008;49:150–3.
10. Gillespie RS, Stapleton FB. Nephrolithiasis in children. *Pediatr Rev.* 2004; 25: 131–9.
11. Basaklar AC, Kale N. Experience with childhood urolithiasis: report of 196 cases. *Br J Urol.* 1991;67:203–5.
12. Erbagci A, Erbagci AB, Yilmaz M, et al. Pediatric urolithiasis—evaluation of risk factors in 95 children. *Scand J Urol Nephrol.* 2003;37:129–33.
13. Wei W, Wang J. A huge bladder calculus causing acute renal failure. *Urol Res.* 2010; 38:231–2.
14. Trinchieri A. Epidemiology of urolithiasis: an update. *Clin Cases Miner Bone Metab.* 2008; 5: 101-6
15. Gault MH, Chafe L. Relationship of frequency, age, sex, stone weight and composition in 15,624 stones: comparison of results for 1980 to 1983 and 1995 to 1998. *J Urol.* 2000; 164:302-7.
16. Lal B, Paryani JP, Memon SU. Childhood bladder stones: an endemic disease of developing countries. *J Ayub Med Coll Abbottabad* 2015;27(1): 17-21
17. Huffman JL, Ginsberg DA. Calculus in the bladder and urinary bladder and urinary diversion. In Coe FL, Favus MJ, Pak CY, Parks JH, Premgir GM, eds. *Kidney stones: medical and surgical management*. Philadelphia, Pa: Lippincott Raven; 1996:1025-34.
18. Hussain M. Endemic bladder calculi in children. What is current position? Editorial. *J Nephrol Urol Transplant.* 2001;2:1-2
19. Gillespie RS, Stapleton FB. Nephrolithiasis in children. *Pediatr Rev* 2004;15:131–8.
20. Stapleton FB. Childhood stones. *Endocrinol Metab Clin N Am* 2002;31:1001–5.
21. Basaklar AC, Kale N. Experience with childhood urolithiasis: report of 196 cases. *Br J Urol* 1991;67:203–5.
22. Ljunghall S, Danielson BG, Fellström B, Holmgren K, Johansson G, Wikström B. Family history of renal stones in recurrent stone patients. *Br J Urol.* 1985;57(4):04–370.
23. Curhan GC, Willett WC, Rimm EB, Stampfer MJ. Family history and risk of kidney stones. *J Am Soc Nephrol.* 1997;8(10):1568–1573.
24. Ahmadi Asr Badr Y, Hazhir S, Hasanzadeh K. Family history and age at the onset of upper urinary tract calculi. *Urol J.* 2007;4(3):142–145.
25. Ali L, Ali S, Shafieullah, Orakzai N. Role of pneumatic lithotripsy in paediatric bladder stones: “I will not cut upon stone!” *Khyber Med Univ J* 2014; 6(2): 60-64
26. Masood A, Khan IZ, Farouk K, Nisar H, Ijaz R, Ishtiaq S, Taimur M. Endoscopic management of bladder calculi in paediatric male patients: An experience with 57 patients. *Isra Med J.* 2019; 11(3): 167-170.
27. Brisson P, Woll M, Parker D, Durbin R. Bladder Stones in Afghan Children. *Military Medicine.* 2012; 177(11): 1403-1405
28. Ni YH, Tsau YK, Chen CH, Hsu TC, Lee JD, Tsai WS, et al. Urolithiasis in children. *Zhonghua Min Guo Xiao Er Ke Yi Xue Hui Za Zhi* 1991;32:9-16
29. Abarchi H, Hachem A, Erraji M, Belkacem R, Outarahout N, Barahioui M. Pediatric vesical lithiasis. 70 case reports. *Ann Urol.* 2003;37(3):117-9.
30. Torricelli FCM, Mazzucchi E; Danilovic A, Coelho RF, Sorougi M. Surgical management of bladder stones: literature review. *Rev. Col. Bras. Cir.* 2012; 40(3): 227-233
31. Salah MA, Holman E, Khan AM, Toth C. Percutaneous cystolithotomy for pediatric endemic bladder stone: experience with 155 cases from 2 developing countries. *J Pediatr Surg.* 2005;40(10):1628-31.
32. Al-Marhoon MS, Sarhan OM, Awad BA, Helmy T, Ghali A, Dawaba MS. Comparison of endourological and open cystolithotomy in the management of bladder stones in children. *J Urol.* 2009;181(6):2684-7
33. Yu DS, Yang YT, Lai CH. Epidemiology and treatment of inpatients urolithiasis in Taiwan. *Formos J Surg* 2016;49:136-41