Original Article

Frequency of symptomatic urolithiasis among patients who admitted in Shiraz hospitals

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Abstract

Background: Urolithiasis is a common condition with a high recurrence rate associated with serious complications. Moreover, it imposes a great financial burden on the patients and healthcare system. We aimed to study the frequency of the patients admitted to Shiraz hospitals because of urinary stones.

Methods: In this study, the information of 1420 patients was collected during 2013 based on the consensus method. The collected information included age, sex, place, time and duration of admission, family history of diseases, the characteristics of urinary stones, and received treatments.

Results: The male-to-female ratio was 1.96:1 with mean±SD age of 47.5±17.3 years. Most of the patients were 40-60 years old. The incidence rate of urolithiasis ranged from 22.2% to 27.8% in different seasons (P>0.05). Mean duration of hospital admissions was 3.8±3.3 days and 37.7% of the patients had another associated medical disease. The most stones were located in the kidney (49.2%) and the ureter (39.4%). Composition of 70.8% of pure stones was calcium oxalate and 18.7% were stag-horn type. Hematuria was the most prominent paraclinical finding (78.3%), and the most used method of treatment was lithotripsy procedures (72%) and 11.1% of the patients underwent open surgery.

Conclusion: Based on the current research, a significant percentage of the patients had urinary stones that highlight the role of effective treatment and follow-up.

Keywords: Female; Hospitals; Patients; Urolithiasis

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Introduction

Urolithiasis is the third most prevalent problem of the urinary system with a global increasing incidence (1). Its prevalence varies in different geographic conditions (2), and is reported 5.7% (ranging from 0.9% to 8.2%) in Iran (3). The peak age of incidence is reported 40-60 years with a male dominancy in Iran (3, 4), which is different from other countries (1).

Various factors have been associated with the incidence of nephrolithiasis, such as diet, low water consumption, and warm climate (5). It is also associated with several comorbidities, such as dyslipidemia (6), hypertension, diabetes mellitus, and obesity (7). Most affected cases remain asymptomatic for a long time and 11-32% develop symptoms (8).

However, 35-50% of symptomatic patient's experience recurrence after 5 years (9), which necessitates proper management (10). Moreover, nephrolithiasis, especially recurrent cases, is associated with severe complications, including chronic kidney disease (CKD), end-stage renal disease (ESRD) (11), and renal and prostate cancers (12, 13). Therefore, multiple treatment strategies have been proposed for kidney stones to prevent further complications, which mainly include dietary therapy, medical therapy, percutaneous nephrolithotomy, and surgical interventions (14).

All in all, it imposes a great economic burden on societies, because of the high prevalence and recurrence rate, and significant complications (15, 16). Because of the different reports in Iran, studying its exact prevalence and the associated factors are of great importance in Iranian population. Therefore, we aimed to study the prevalence of the patients admitted for urinary stones to Shiraz hospitals.

Methods

In this retrospective study, three hospitals of Shiraz city, which are the referral centers for urological problems, including Faghihi, Nemazee, and Dena Hospitals were selected, and all the patients who admitted with impression of urolithiasis were investigated. The protocol of the study was approved by Shiraz University of Medical Sciences. The patients' information was kept confidential and analyzed anonymously. Based on the consensus method, information of all patients admitted to these hospitals in 2013 was collected. The patients with incomplete medical records were not enrolled in the study.

The collected information included age, sex, place of hospital admissions, time and duration of admission, history of other comorbid diseases, characteristics of urinary stones, including anatomical location and size, radiological and laboratory findings, and received treatments.

Results were presented as mean±standard deviation (SD) for quantitative variables and were summarized by frequency (percentage) for categorical variables. Continuous variables were compared using *t* test or Mann-Whitney U test, whenever the data did not appear to have normal distribution or when the assumption of equal variances was violated across the study groups. On the other hand, categorical variables were compared using Chi-square test. For the statistical analysis, the statistical software SPSS version 16.0 for windows (SPSS Inc., Chicago, IL) was used. P values of 0.05 or less were considered as statistically significant.

Results

Of the 1420 patients, 65.7% were men and 34.3% were women, with a male-to-female ratio of 1.96:1 and a mean±SD age of 47.5±17.3 years (range: 2-93 months). Most of the patients were 40-60 years old. Among all the patients, 78.4% had a positive history of urolithiasis, while 31.1% had a positive family history of urolithiasis. Associated medical disease was present in 36.7% of the patients, including hypertension (41.1%), diabetes mellitus (22.1%), hyperlipidemia (11.5%), single kidney disease (9%), benign prostate hyperplasia (7.2%), ESRD (3.4%), double collecting system (1.1%), and other diseases (less than 0.5%). 1.4% of all the participants were pregnant at the time of study.

Mean duration of hospital admissions was 3.8±3.3 (1-37) days. There was no significant difference among different seasons of the year (P>0.05). The prevalence of urolithiasis among the patients who were admitted in the three hospitals was 2.53%.

The frequency of stone according to the location included the kidney in 49.2% of the cases, the ureter in 39.4%, the bladder in 9.9%, and the urethra in 1.5% of the cases.

The frequency of the size of calculi according to the location of the stone among the studied patients is demonstrated in table 1. Regarding composition of most analyzed stones, 55.4% were mixed (mostly calcium oxalate and uric acid [43.2%], and calcium oxalate and phosphorus [36%]), and 44.6% were pure stones (frequently calcium oxalate [70.8%], uric acid [25.3%], and cysteine [3.9%]). The combination of stones was not significantly associated with sex of the patients (P>0.05).

Regarding the type of the stones, 18.7% of all the stones were staghorn and 81.3% were non-staghorn, which was not significantly associated with the patients' sex (P>0.05).

Among the paraclinical findings, hematuria was the most prominent paraclinical finding (78.3%) and other signs, such as proteinuria and increased serum level of creatinine and blood urea nitrogen, were observed in 13-37% of the patients (Table 2). Most of ultrasound examinations revealed no abnormal finding (81.9%), and renal cyst was observed in 16.4% of the patients, and congenital abnormality in 2.7% (double collecting system [1%], ectopic cyst [0.5%], and ureterocele [0.2%]). Radiological findings revealed renal cyst in 37.9% of the patients and 62.1% of the cases were normal.

The most used method of treatment was lithotripsy (72%), followed by open surgery in 11.1% and conservative management in 8.1% of the patients. The rest of management included double-J insertion in 5.5%, ureteroscopy in 2%, nephrostomy tube insertion in 0.8%, and cystoscopic and laparoscopic procedure in 0.4 and 0.1% of the patients, respectively. Also, different methods have been implemented for lithotripsy procedures, including percutaneous nephrolithotomy (53.7%), transurethral lithotripsy (33.2%), extracorporeal shock wave lithotripsy (8.2%), cystolithalopaxy (4.8%), and urethral lithotripsy (0.1%).

Table 1. The frequency of the size of calculi according to the location of the stone among the studied patients

Location		Size of the stones						Total
Location of calculi		<4 mm	4-7 mm	8-11 mm	12-15 mm	16-20 mm	>20 mm	
	Kidney	6.9%	12.6%	16.8%	15.9%	19.2%	28.6%	N=548
	Ureter	1.6%	21%	49.2%	13.3%	9.3%	5.6%	N=248
	Bladder	1.7%	1.7%	15.3%	15.3%	27.1%	39%	N=59

Table 2. The paraclinical findings of the studied patients

		Category	Percentage
Urine analysis	Crystalluria	Calcium oxalate	14.9%
		Uric acid and urate	12.5%
		Phosphate	0.8%
		Without crystal	71.8%
	Hematuria	Positive	78.3%
		Negative	21.7%
	Proteinuria	Positive	35.1%
		Negative	64.9%
Serum test	Creatinine	Normal(0.7-1.3 mg/dL)	80.1%
		Elevated	19.9%
	Blood urea nitrogen	Normal (7-20 mg/dL)	86.8%
		Elevated	13.2%

And the different surgical procedures included nephrolithotomy (41.5%), cystolithotomy (27.9%), ureterolithotomy (14.9%), nephrectomy (13.7%), and urethrolithotomy (0.6%).

Discussion

The present study revealed a prevalence of 2.53% for symptomatic urolithiasis in patients admitted to Shiraz hospitals. The male-to-female ratio was 1.96:1 with mean±SD age of 47.5±17.3 years and the most patients were 40-60 years old. Most stones were located in the kidney (49.2%) and the ureter (39.4%). Composition of the most stones was calcium oxalate and the most used method of treatment was lithotripsy procedures (72%) and 11.1% of the patients underwent open surgery.

Different prevalence rates have been reported in different populations with an increasing rate in the recent years (19). In 2007, an Iranian study by Safarinejad on 7,649 participants from different cities, reported the prevalence of urolithiasis to be 5.7%, which increased to 8.2% in the patients aged 60-69 years (3). Also in the study on 2431 residents of Kerman, the researchers found a prevalence of 24% for urinary calculi (20) and in another study in Amirkola on 1390 elderly people with a mean age of 69.37 years, the prevalence of renal stones was 14.53% (21), but the total prevalence in the present study was lower, because participant in this study differ from mentioned study. Results from Safarinejad, study indicating higher prevalence of urolithiasis in south and southwest cities of Iran, which has been associated with the mean annual temperature of these regions (3). The higher prevalence of urolithiasis in such regions of the country highlights the role of hot and dry climates, which has been previously proposed in epidemiological studies (5), and indicates greater need for educating the population in such cities, including Fars Province.

Mean age of the patients in the present study (47.5±17.3 years) was also close to the study by Basiri and co-workers (41.5±16.3 years) (4) and Emami-Naini and colleagues (46±13.8 years) (22). In addition, the peak age of urolithiasis was 40-60 years in the current study, which was in line with other Iranian studies, reporting increased incidence by increasing age (3, 4). The male dominance of urolithiasis, reported in the present study, confirmed the results of previous studies. Safarinejad has reported a male-to-female ratio of 1.15:1 (3). Also, another study by Basiri and colleagues in 2006-2007 studied 6089 image-proven urolithiasis among 12 zones of Iran and have reported a male-to-female ratio of 1.38 (4). Hosseini and colleagues also evaluated 376 patients with renal stone in Shiraz and reported a male-to-female ratio of 1.7:1 (23). But the present study reported a higher rate of the male patients, which might be due to the fact that the study population in the present study included the hospitalized patients, which may affect the patients' sex ratios. On the other hand, Nouri-Majalan and co-workers assessed 105 patients with nephrolithiasis in Yazd and reported a higher sex ratio (2.3:1) than the present study (24), which might reflect the differences in demographic characteristics of the study population.

In the present study, 31.1% had a positive family history of urolithiasis, which was consistent with the results of Emami-Naini and colleagues, reporting positive family history in 41.2% of patients suffering from nephrolithiasis in Isfahan (22). A higher rate of positive family history (68%) was reported by Nouri-Majalan in the patients with recurrent renal calculi (24). This issue, highlighted in the current study, which is consistent with the results of the mentioned studies, indicates the significant role of genetic and familial role in urolithiasis, especially in the recurrent cases. Association with hypertension and diabetes mellitus was reported to be 40.3% and 9.2%, respectively, in the study by Emami-Naini and colleagues (22), and in the study by Basiri and colleagues (hypertension [15.8%] and diabetes mellitus [11.4%]) (4), which is similar to the results of our study

(hypertension [41.1%] and diabetes mellitus [22.1%]). Therefore, considering the comorbidities of the patients with urinary calculi is of great importance.

In this study, calcium oxalate was identified as the most common chemical composition; (1, 25-29). But the different methods of studying the compositions of the stones limits a proper comparison among studies (28). Moreover, the kidney was reported as the most common site of urinary calculi in the current study, which was consistent with the results of other studies. Size of the stones is also identified an important factor determining the kidney function and treatment protocols (29, 30). In the present study, most of the patients had a calculi of 8-11 mm, which was associated with the rate of treatment protocols selected in the present study.

Our study had various strengths, including studying a large number of patients admitted to referral urinary centers and reporting various characteristics of the affected patients and the calculi, which can give researchers and physicians a broader view regarding the epidemiology of urolithiasis in Shiraz. Nevertheless, the retrospective nature of the present study produced some limitations, including inability to report some data, such as 24-hour urinary examination, which were mostly incompletely recorded in the medical records. In addition, this study did not limit the age of the patients into adults and also included children, but as studies have suggested, the pediatric characteristics of urolithiasis may be different.

In conclusion, the results of the present study indicated a high prevalence of urinary calculi with male dominancy, especially in age range of 40-60 years, which highlights the significance of this disease in Shiraz city and identified other details of the stones that help further researchers and physicians in the choice of the most appropriate treatment protocols for the studied population.

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Conflict of interest

Authors declare no conflict of interests.

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