Urinary stone distribution in Samawah: current status and variation with age and sex a cohort study

Saad Hallawee[1*]

The aim of the study was to describe the distribution of urinary stone. Age, sex, anatomical site and geographical correlations data were investigated. Cross-sectional and prospective data was made of three hundred and one (301) patients with stone were recorded in the consultation unit of Al-Hussien teaching hospital, Samawah city. The cohort study included 224 men (74%) and 77 women (26%) with a male to female ratio of 2.9:1 and a median age of 48 years (range 41-60 years). 181(60) patients have a single urinary stone and 120(40%) patients have multiple stone, 70(58%) live in rural area. The size of the stone was variable and large stone more than 1cm seen in 132 patients (43%). Left kidney was the first anatomical site in 92 patients (30 %) and 81 patients (26%) have right kidney stone. Our data concluded that urinary stones disease is a common problem in Samawah city with more predilection to affect male than female and more frequent in age ≤ 40 years, with tendency to involve left kidney. Rural area showed increased prevalence of urinary stone with tendency of multiple stone.

Keywords: Urinary stone, Prospective study, Anatomical site, Multiple stone

*Corresponding author: Saad Hallawee: saadhallawee@yahoo.com
[1]Department of Medicine, College of Medicine, Muthanna University
Received 12 July 2015; Accepted 01 November 2015; Published 30 December 2015

Introduction

Urinary stones are the third most common affliction of the urinary tract, they are exceeded by urinary tract infection and prostate pathological condition [1]. So Nephrolithiasis remains a major economic and health burden worldwide. The pathogenic mechanisms of kidney stone formation are complex and involve both metabolic and environmental risk factors. Over the past decade, the increased prevalence of kidney stone disease is pandemic [2]. One of the presenting problems with the kidney stone is the high rate of recurrence; after the initial stone there is 50% chance of forming a new stone if left untreated [3]. Preventing recurrence is largely specific to the type of stone (e.g., calcium oxalate, calcium phosphate, cystine, struvite, and uric acid stones); however, even when the stone cannot be retrieved, urine pH and 24-hour urine assessment provide information about stone-forming factors that can guide prevention [4]. The results from 24hrs urine collections serve as the cornerstone on which therapeutic recommendations are

based. Recommendation on lifestyle modification should be deferred until urine collection is complete [5]. Nephrolithiasis, or kidney stone disease, is a common, painful, and costly condition. The classic presentation of a renal stone is acute, colicky flank pain radiating to the groin. As the stone descends in the ureter, the pain may localize in the abdominal area overlying the stone and radiate to the gonad [6]. Geographic variation in the rates of kidney stones has been observed for many years. Rates of hospitalization for stones vary considerably not only among countries, with higher rates in industrialized nations compared with developing and Third World countries but also regionally within countries. Based largely on ecologic observations, some investigators contend that differences in dietary protein or refined carbohydrate intake provide the most likely explanation for these contrasts. Others have suggested that the differences may be due to variations in climate, water quality, or the prevalence of comorbid conditions that may affect the risk of stones [7]. Nephrolithiasis is a systemic disorder. Several conditions predispose to stone formation, including gastrointestinal malabsorption (e.g., Crohn's disease, gastric bypass surgery), primary hyperparathyroidism, obesity, type 2 diabetes mellitus, and distal renal tubular acidosis. A number of other medical conditions are more likely to be present in individuals with a history of nephrolithiasis, including hypertension, gout, cholelithiasis, reduced bone mineral density, and chronic kidney disease. Medications, such as protease inhibitors, antibiotics, and some diuretics, increase the risk of some types of kidney stones, and patients should be counseled about the risks of using these medications. Managing diet, medication use, and nutrient intake can help prevent the formation of kidney stones [4]. Efforts to prevent stone formation are, therefore, essential. Dietary factors play an important role in kidney stone formation. Tailored dietary recommendations based on metabolic evaluation should be offered to patients for the prevention of recurrence of stone formation. Dietary intervention and subsequent evaluations of therapeutic efficacy should be based on results from multiple 24hrs urine collections [8]. Nutritional factors implicated in stone disease are linked with the preventive intervention. Dietary measures are the first level of intervention in primary prevention as well as in secondary prevention of recurrences [8]. This study was done to determine urinary stone prevalence among stone former according to age, gender, place of residence, water supply and stone size and number in each patient.

Methods and materials

A 301 patients complaining of urinary tract stone have been assessed in consultation department of Al-Hussien teaching hospital, in Samawah, their age range from 22-70 years. A careful history items applied to cover the information about the age, gender, place of residence, and water supply. Clinical examination has been done to confirm the diagnosis and excluding other surgical possibilities. Then they examined by a requested abdominal sonography to assess the site of the stone (anatomical position), size and numbers of stones in each patient.

Results

The age range from 30-70, maximum prevalence seen in young age group ≤30

years, followed by age 31-40 group with decreasing rate toward elderly age group as in table 1. The present data showed that the rural area have higher prevalence than urban area as in figure 1. Further, the prevalence of the urinary stone was significantly higher in male than female in all age group (out of 301 patients, 224 male and female patients were 77) as in figure 2. While the data in figure 3, clearly illustrated that the prevalence of the multiplicity of the stone were 181 patients having single stone in the urinary tract, and 120 patients having multiple stones, more than half of them are living in rural area.

The results of figure 4 showed that the large stone (>1cm) among the patients involved in this study are more in male patients. Anatomically, the left kidney was the most abundant site to have urinary stone (92%) followed by right kidney (81%). 49 patients (16.1%) having stone involve both sides which is significant medical condition that affect kidneys function in the future. Urinary bladder stone seen in 21 patients with one female patient only. Figure 5, clarify the same anatomical sites in illustration diagram.

Age of the patient (years)	Female No. 77	Male No. 224	Total No. of cases No.301
≤ 30	18(23.3%)	62(27.6%)	80(27.6%)
31- 40	16(20.7 %)	54(24%)	70(23 %)
41- 50	20(25.9 %)	44(19.6%)	64(21%)
51 - 60	19(24.6%)	41(18.3 %)	60(19 %)
≥ 61	4(5%)	23(10.2%)	27(9%)

Table 1.
Stone distribution according to the age of the patients

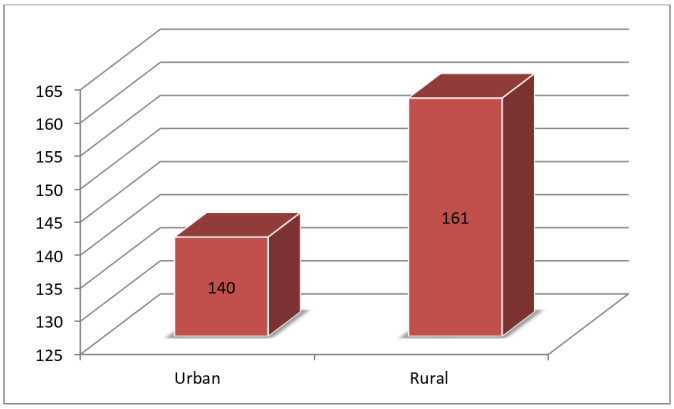

Figure 1.
Shows the residence distribution in a diagram.

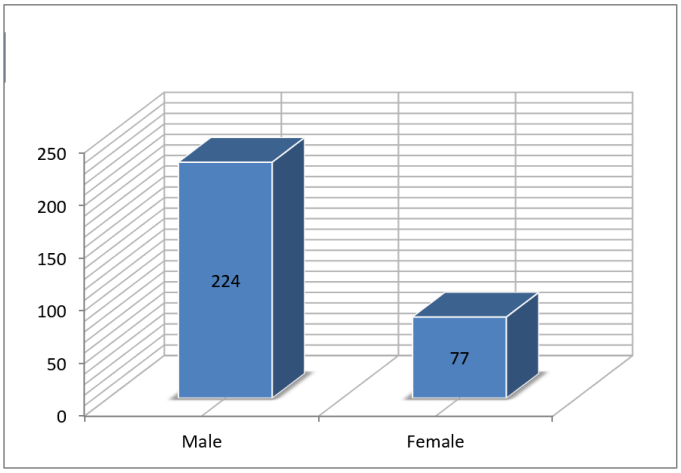

Figure 2.
Shows the gender distribution of the patients.

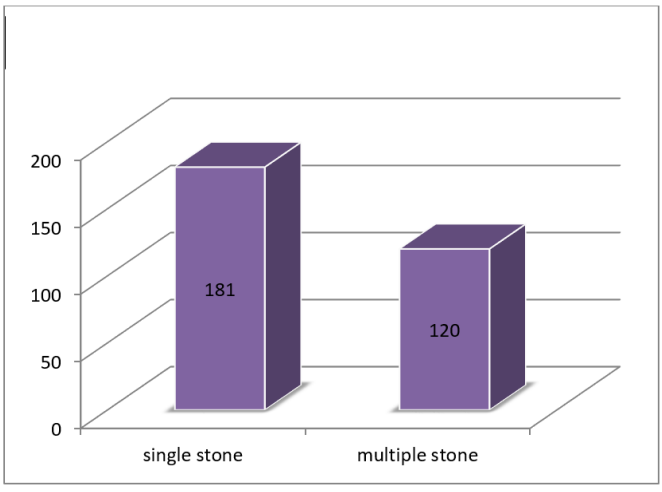

Figure 3.
Shows the number of the patients with large(>1cm) stones.

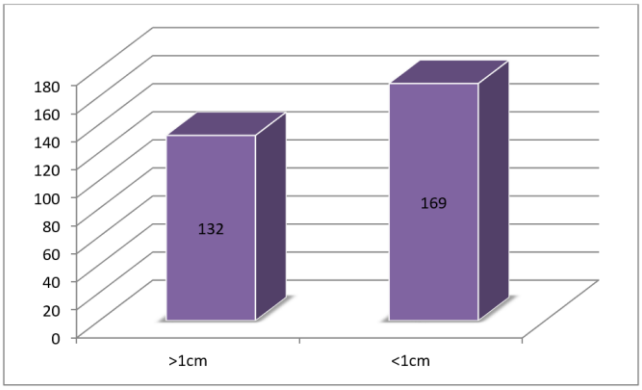

Figure 4.
Shows the number of the patients with large(>1cm) stones.

Stone site	No. of cases (% of occurrence)		
	Female	Male	Total
Right Kidney	25 (28.7%)	56(26%)	81(26.9%)
Left Kidney	30 (34%)	62 (28.9%)	98(32.6%)
Right Ureter	4 (1.8%)	21 (9.8%)	25(8.3%)
Left Ureter	5 (2.3%)	22 (10.2%)	27(9%)
Both sides	14 (16 %)	35 (16.3%)	49(16.2%)
Urinary Bladder	1 (1.1 %)	20 (9.3%)	21 (7%)

Table 2.
Shows the prevalence of anatomical sites.

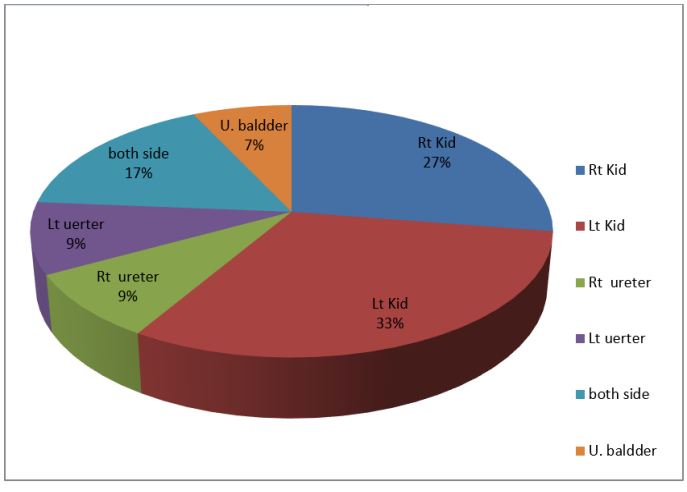

Figure 5.
Shows the prevalence of anatomical sites of urinary stones.

Discussion

Urolithiasis is a multifactorial disorder and complex process that is a consequences of an imbalance between promoters and inhibiters in the kidney [9]. Renal stone formation and the predominant chemical stone composition are age and gender dependent. Most stones are formed at older ages. However, many clinicians report the impression that patients are becoming younger when presenting with an initial stone event. Urinary stone disease remains rare in children with a stable overall incidence in most series [10]. Data suggest that testosterone appears to promote stone formation by suppressing osteopontin expression in the kidneys and increasing urinary oxalate excretion, while estrogen appear to act inversely. It is postulated that lower serum testosterone level is regarded as protective for women and children against oxalate stone formation. In contrast, it is reported that higher mean of plasma oxalate concentration and higher kidney calcium oxalate stone deposition in men are influenced by androgens [9]. This explain our results about the increasing the prevalence of renal stone in male than female (2.8:1) and less occurrence of renal stone in children and teen age. Another factor that explain this difference is the social factors that make female patients relatively less doctor seeking than male patient. In developing neighboring countries, the results of male to female ratio in Iran was 1.15:1[11], and in Saudi Arabia 5:1[12]. In other study done in hospitalized patient in Baghdad the ratio was 2.5:1[13]. Other result is the increased prevalence of renal stone in rural area more than urban areas, which may be explained by the effect of climate and water supply (1.2:1). Kidney

stones form in response to environmental and/or metabolic risk factors. Low urine volume, an important environmental factor, reflects low fluid intake or excessive fluid loss and directly increases stone risk by increasing urinary saturation of stone-forming salts [14].

Another suggested mechanism is that increases in sun exposure (specifically UV light) leads to the increased production of 1,25-OH-vitamin D, which in turn increases the absorption of dietary calcium and possibly the excretion of calcium in the kidneys [15]. The result of a relevant study of renal stone prevalence in Thebes, Greece shows 15% of urolithiasis affect rural areas [16]. About 40% of patients show tendency to develop multiple renal stone and also 44% of patients have larger size stone more than 1 cm, which may be related to the environmental and nutritional factors that blamed to increase the prevalence of renal stones.

Different symptoms due to the calculi are depended upon their size which ranges from few millimeters to the centimeters. Generally, the stones below 5 mm size flush out automatically by the urinary tract. But the stones above 5 mm requires medical management otherwise it can lead to complications like severe pain, dysuria, hematuria etc. [17]. The mean numbers of days required to pass urinary stone differ according to the size, as ≤2cm, 3cm and 4-6 cm require 8, 12 and 22 days respectively to pass through with increasing likelihood of eventual need for intervention [6].

Competing interests

The author declares that there is no conflict of interest.

References

1. Marshall LS, Jack WM, Tom FL. Smith and Tanagho's General Urology, Urinary Stone Disease, 18 Edition.
2. Khashayar S, Naim MM, Bridget S. Kidney Stones: Pathogenesis, Diagnosis, and Management. J. of Clinical Endocrinology and Metabolism 2012;97(6):1847–1860.
3. Sutherland JW, Parks JH, Coe FL. Recurrence after a single renal stone in a community practice. Mineral / Electrolyte Metabolism 1985;1:267-9.
4. Lynda F, Ingrid K, Treatment and Prevention of Kidney Stones: An Update 2001. American fam. Physician 2001;84(11):1234-1242.
5. Gary CC; Nephrolithiasis. Harrison's principles of internal medicine.
6. Joel MH. Acute Renal Colic from Ureteral Calculus, New England J. MED 2011;7:350.
7. Michael S, Ralph JC, William M, et al. Relation between Geographic Variability in Kidney Stones Prevalence and Risk Factors for Stones, American Journal of Epidemiology 1996;6;143.
8. Anita S, Sharma RK. Nutritional aspect of nephrolithiasis. Indian J Urol. 2010;26(4):523–530.
9. Mohammod RN, Mnasour B, Mehdi H, Androgen involvement in pathogenesis of renal stone formation: Puplic Library of Science 2014;9-4.
10. Thomas K, Anne BS. Urolithiasis through the age: Data on more than 200000 urinary stone analysis.The journal of urology 2011;185:1304-1311.
11. Safarinejad MR. Adult urolithiasis in a population-based study in Iran: prevalence, incidence, and associated risk factors. Urology and Research J. 2007;35:73-82.
12. Khan AS, Rai ME. Gandapur, et al. Epidemiological risk factors and composition of urinary stones in Riyadh Saudi Arabia. J Ayub Medical College Abbottabad 2004;16:56-8.
13. Qaader DS, Yousif SY, Mahdi LK. Prevalence and etiology of urinary stones in hospitalized patients in Baghdad. East Mediterranean Health J. 2006;12:853-61.
14. Tom HB, Yair L, Margaret SP. Climate-related increase in the prevalence of urolithiasis in the

United States. Proceedings of the National Academy of Science 2008;105(28):9841-9846.
15. Jeffrey S. Kidney Stones and Climate Change. Clinical Correlations /The NYU Langone Online Journal of Medicine 2010;10: 12-19.
16. Stamatiou KN, Karanasiou VI, Lacriox P, et al. Prevalence of urolithiaisis in rural Thebes, Greece. Rural and remote health 2006;6:12-610.
17. Sarang D, Shailesh M, Suhgail A, et al. A Case Report of Urolithiasis of Patient with Multiple Bilateral Renal Stones. International Journal of Scientific and Research Publications 2013;3:21-28.