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# Assessment of renal stones: A Ultrasonographic study

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**Abstract**
**Background:** Renal stones are common in today's world. The present study was conducted to determine renal stone with USG.
**Materials & Methods:** The present study was conducted on 124 cases of renal stones diagnosed with USG of both genders. In all patients, USG Scan with Aloka SSD-500 with frequency convex probe, and Honda SSD-500 with frequency (3.5 MHz) convex probe was taken. The size and location of all renal stones were evaluated.
**Results:** Out of 124 patients, males were 84 and females were 60. Maximum stones were in size of 4-10 mm (48) followed by >10 mm (34), 2-4 mm (22) and <2 mm (20). The difference was non-significant (P> 0.05). Maximum stones were present in lower calyx (56) followed by middle calyx (30), pelvis (21) and upper calyx (17). The difference was significant (*P*< 0.05).
**Conclusion:** Authors found that most of the stones were of size 4-10 mm and maximum were present in lower calyx.

**Keywords:** Renal stones, Ultrasonography, upper calyx

## Introduction

Renal calculi are becoming a most common problem, because of the living nature of people. The occurrence of renal stone is usually believed to be due to crystallization of minerals inside urine, which act as the nidus for more sedimentation and finally the formation of a stone within the kidney [1]. Calculi are due to abnormal collection of certain chemicals like oxalate, phosphate and uric acid. These calculi can be present in kidney, urethra or in urinary bladder. Most of the previous study in diagnosis of renal calculi spots out the presence or absence of the calculi in the kidney. In this paper we propose an algorithm to detect the renal calculi and to find the size of the calculi. It is more helpful to change the diet conditions [2]
Ultrasonography (USG) is an accessible, relatively inexpensive imaging method that comes without the risks of exposure to ionizing radiation entailed by CT. Stafford *et al*. reported the ability to detect stones as small as 2 mm using USG imaging in a porcine model more than 30 years ago [3]. With an ability to demonstrate radiopaque and radiolucent stones, hydronephrosis, renal inflammation, ruptured fornices, ureteric jets and resistive index, USG can provide valuable clinical information. Despite the wider availability of USG units and increased bedside utilization, the national usage of USG for renal colic had not significantly changed from 2000 to 2008, although the use of CT scans has increased dramatically [4]. The present study was conducted to determine renal stone with USG.

## Materials & Methods

The present study was conducted in the department of Radiodiagnosis. It comprised of 124 cases of renal stones diagnosed with US of both genders. Ethical clearance was obtained before starting the study and written consent was taken from all patients.
General information such as name, age, gender etc. was recorded. In all patients, USG Scan with Aloka SSD-500 with frequency convex probe, and Honda SSD-500 with frequency (3.5 MHz) convex probe was taken. The size and location of all renal stones were evaluated. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

## Results

**Table I:** Distribution of patients

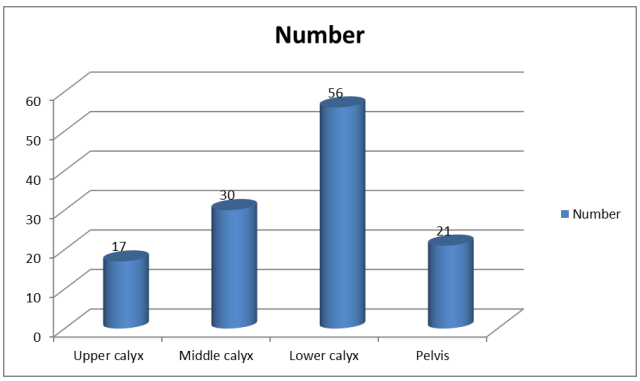
| Total- 124 | | |
|---|---|---|
| **Gender** | **Males** | **Females** |
| Number | 84 | 60 |

Table I shows that out of 124 patients, males were 84 and females were 60.

**Table II:** Size of renal stones

| Size (mm) | Number | P value |
|---|---|---|
| <2 | 20 | 0.21 |
| 2-4 | 22 | |
| 4-10 | 48 | |
| >10 | 34 | |

Table II shows that maximum stones were in size of 4-10 mm (48) followed by >10 mm (34), 2-4 mm (22) and <2 mm (20). The difference was non- significant (P> 0.05).




**Graph I:** Location of renal stones

Graph I shows that maximum stones were present in lower calyx (56) followed by middle calyx (30), pelvis (21) and upper calyx (17). The difference was significant (*P*< 0.05).

## Discussion

Renal stones, or nephrolithiasis, are a common problem worldwide. With its increasing prevalence, they are imposing a significant economic burden for both developing and developed nations. It has been observed that renal stones are associated with systemic diseases like Type 2 diabetes mellitus, obesity, dyslipidaemia, and hypertension. Lifestyle and environmental factors contribute significantly in their formation [5]. Presentation of renal colic is common and therefore treatment is not delayed. However, in the absence of any preventive measures >50% of renal stones may reoccur. The relative safety and low cost of USG were noted to justify its use in the detection of the relatively rare but serious complications of silent obstruction [6]. The present study was conducted to determine renal stone with USG.

In present study, out of 124 patients, males were 84 and females were 60. Maximum stones were in size of 4-10 mm (48) followed by >10 mm (34), 2-4 mm (22) and <2 mm (20). Mith- Bindman *et al*. [7] conducted a study in which a total of 552 USG were selected. Overall, the sensitivity and specificity of USG was 54 and 91%, respectively. There was a significant association between sensitivity of USG and stone size (P < 0.001), but not with stone location (P = 0.58). Location also plays a role when counseling patients about intervention. A lower pole stone location significantly affects outcomes with shockwave lithotripsy, and may affect outcomes with ureteroscopy.

We found that maximum stones were present in lower calyx (56) followed by middle calyx (30), pelvis (21) and upper calyx (17). Renal stones are common in obese and diabetic individuals. The recurrence rate of renal stones is high, with 50% recurring within 5 years of the initial stone event. The factors that determine the accelerating pace of stone formation in recurrent stone formers are not well known. Therefore, in any single stone former, one cannot predict which patient will relapse, however, the natural history of stone disease and the high rate of recurrence requires careful diagnostic evaluation and early treatment [8].

The three narrowest parts of the ureter are at the pelvo-ureteric junction, the mid-ureter, where the ureter crosses the iliac vessels, and the vesico-ureteric junction (VUJ). The VUJ is the most common site of obstruction. Patients may present with renal colic, experiencing a severe sharp pain at the flanks which has a sudden onset, with fluctuation and intensification over 15–45 minutes. It then becomes steady and unbearable, often accompanied by nausea and emesis. As the stone passes down the ureter towards the bladder, flank pain changes in a downward direction towards the groin. When the stone is lodged at the VUJ, urinary frequency and dysuria may appear [9].

## Conclusion

Authors found that most of the stones were of size 4-10 mm and maximum were present in lower calyx.

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