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## ORIGINAL RESEARCH

# Ultrasonographical analysis of renal stones patients

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## ABSTRACT
**Background:** Hard mineral and salt deposits that develop inside the kidneys are called kidney stones, or renal calculi. When they pass through the urinary tract, they may cause severe pain and discomfort and vary in size and substance. The present study was conducted to assess renal stones using Ultrasonography. **Materials & Methods:** 60 cases with renal stones of both genders were selected. Using a Toshiba machine with a transmit frequency of 2.5 to 6.0 MHz, everybody underwent color doppler USG. Urinary stones were evaluated for size, posterior acoustic shadowing, and echo contrast between the stone and surrounding tissue in order to assess their grayscale US appearance. Only the US grayscale was used to establish the size of the stone. **Results:** Out of 36 patients, 36 were males and 24 were females. In 34 cases, the size of renal stones was <4 mm and in 36 cases, it was >4 mm. Echo findings found to be marked in 20, slight in 29 and indistinct in 11 cases. The difference was non- significant (P> 0.05). **Conclusion:** Echo results were found to be marked, slight and indistinct. With little loss of specificity, the color doppler enhances renal and ureteral stone detection, diagnostic confidence, and overall accuracy.
**Keywords:** renal stones, color doppler Ultrasound, posterior acoustic shadowing



## INTRODUCTION
Hard mineral and salt deposits that develop inside the kidneys are called kidney stones, or renal calculi. When they pass through the urinary tract, they may cause severe pain and discomfort and vary in size and substance.[1] A typical imaging method for diagnosing and assessing renal lithiasis—the presence of kidney stones or renal calculi—is ultrasound (USG).[2,3] USG is a popular initial imaging technique for evaluating kidney stones since it is non-invasive, reasonably priced, and does not expose the patient to ionizing radiation. Ultrasonography (US) is a widely available, reasonably priced imaging technique that does not involve the ionizing radiation exposure dangers associated with CT.[4]
Kidney stones in the kidneys or urinary tract can be successfully found using ultrasound. It is especially helpful for recognizing bigger stones.[5] The size, position, and quantity of kidney stones can all be ascertained with the aid of USG. Decisions about treatment should be guided by this knowledge.[6] An ultrasound can show whether a kidney stone is obstructing or blocking the urinary tract, which can result in a pee backup and other problems. Any kidney stone-related problems, including infection, hydronephrosis (infection caused by kidney enlargement), and other anomalies, can be detected by USG. Stone movement and positional changes over time can be tracked using ultrasound. This can be crucial for monitoring how a stone is moving through theurinary tract.[7]The present study was conducted to assess renal stones using Ultrasonography.

## MATERIALS & METHODS
The present study comprised of 60 cases with renal stones of both genders. All gave their consent to participate in the study.
Data such as name, age, gender etc. was recorded. Using a Toshiba machine with a transmit frequency of 2.5 to 6.0 MHz, everybody underwent color doppler USG. Urinary stones were evaluated for size, posterior acoustic shadowing, and echo contrast between the stone and surrounding tissue in order to assess their grayscale US appearance. Only the US

grayscale was used to establish the size of the stone. Results thus obtained were subjected to statistical analysis. P value less than 0.05 was considered significant.

## RESULTS

**Table I Distribution of patients**

| **Total- 60** | | |
|---|---|---|
| **Gender** | **Males** | **Females** |
| Number | 36 | 24 |

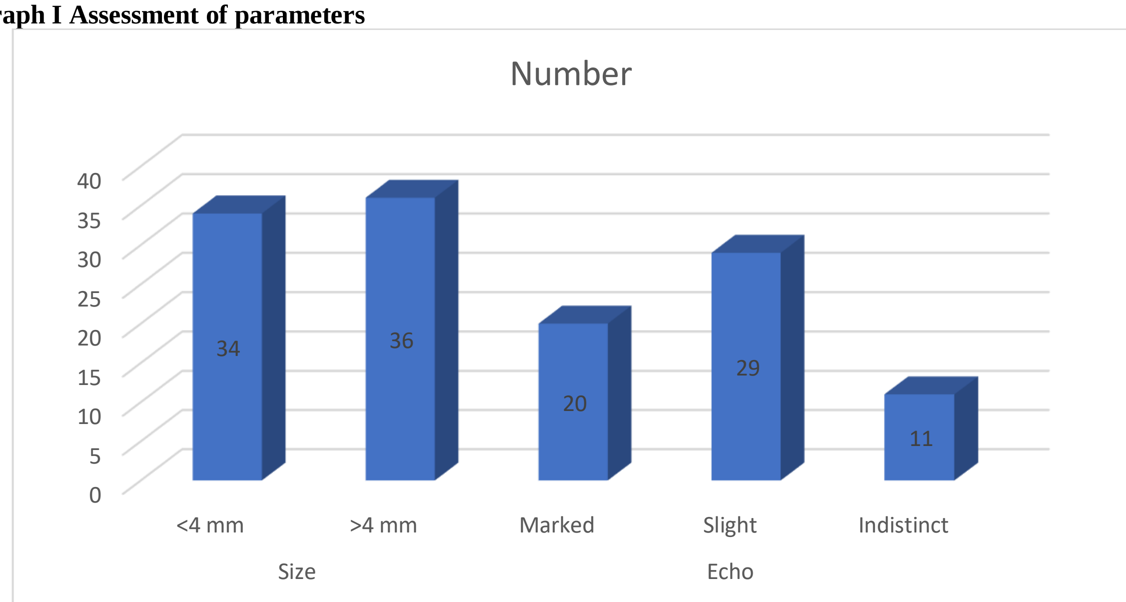
Table I shows that out of 36 patients, 36 were males and 24 were females.

**Table II Assessment of parameters**

| Parameters | Variables | Number | P value |
|---|---|---|---|
| Size | <4 mm | 34 | 0.97 |
| | >4 mm | 36 | |
| Echo | Marked | 20 | 0.18 |
| | Slight | 29 | |
| | Indistinct | 11 | |

Table II, graph I shows that in 34 cases, the size of renal stones was <4 mm and in 36 cases, it was >4 mm. Echo findings found to be marked in 20, slight in 29 and indistinct in 11 cases. The difference was non- significant (P> 0.05).

**Graph I Assessment of parameters**




## DISCUSSION

In both industrialized and developing nations, renal stones are a prevalent condition. Due to the rapid changes in food patterns and the rising standard of living, this pathology has become more prevalent in recent decades.[8] The incidence, location, and chemical makeup of calculi have all been impacted by changes in socioeconomic circumstances over time. Renoureteralcalculosis, which primarily consists of calcium oxalate and phosphate, is more common in economically developed nations than renal stones, which are made of calcium and ammonium urate.[9] Globally, chronic kidney disease (CKD) is emerging as a significant public health issue. More than 30 years ago, a study showed that US imaging could identify stones as small as 2 mm in a pig model. US can offer useful clinical information by demonstrating radiopaque and radiolucent stones, hydronephrosis, renal inflammation, ruptured fornices, ureteric jets, and resistive index.[10]The present study was conducted to assess renal stones using Ultrasonography.

We found that out of 36 patients, 36 were males and 24 were females.Mitterberger et al[11] evaluated the diagnostic accuracy of the color Doppler "twinkling sign" in comparison to regular grayscale ultrasound for the identification of urinary stones. Forty-one patients who had at least one kidney or ureter stone on an unenhanced CT scan were included in the study. An observer who was blind to the CT results assessed each patient using color Doppler imaging and grayscale ultrasonography. There were 47 intrarenal stones, 5 renal pelvic stones, 8 ureteropelvic junction stones, 5 ureteral stones, and 12 ureterovesical junction stones among the 77 stones found in 41 patients. In 66% (51/77) of cases, the diagnosis of stone was made with confidence using grayscale sonography. In 97% (75/77) of cases, the diagnosis of stone was made with confidence utilizing Doppler sonography and the twinkle sign. For the diagnosis of urinary stones, clustered ROC analysis showed that the Doppler twinkling sign (Az = 0.99) was considerably superior to traditional gray scale criteria (Az = 0.95).

We found that in 34 cases, the size of renal stones was <4 mm and in 36 cases, it was >4 mm. Echo findings found to be marked in 20, slight in 29 and indistinct in 11 cases. Kanno et al[12]assessed the efficacy of ultrasonography (US) for detecting renal stone using noncontrast enhanced computed tomography (NCCT) as a standard reference. They performed a retrospective study of 428 patients who underwent NCCT and US imaging. The sensitivity of US to detect each individual stone and at least 1 stone per kidney was evaluated. The detection rates according to the location and stone size were also examined. We compared the sizes of stones determined in the longest axis of NCCT and US, and performed group classification based on size to examine whether stone sizes measured by NCCT and US were similar.Of 856 kidneys, NCCT detected 474 stones in 361 kidneys, whereas US detected 332 stones of 474 stones detected by NCCT, yielding a sensitivity of 70.0% and a specificity of 94.4%. Similarly, US alone detected at least 1 stone in 285 kidneys, yielding a sensitivity of 78.9% and a specificity of 83.7%. Expectedly, the detection rate for the left upper calyx was lower than that for other sites (P = .002), and the detection rate increased with stone size. Furthermore, stone sizes obtained by US were positively correlated with those obtained by CT, and stone size measurement by NCCT and US was concordant in 240 of 332 cases (72%). Importantly, stone size was only a factor that affected renal stone diagnosis using US.US is an effective imaging modality for detecting renal stones.

Smith-Bindman et al[13]randomly assigned patients 18 to 76 years of age who presented to the emergency department with suspected nephrolithiasis to undergo initial diagnostic ultrasonography. They compared the three groups with respect to the 30-day incidence of high-risk diagnoses with complications that could be related to missed or delayed diagnosis and the 6-month cumulative radiation exposure. Secondary outcomes were serious adverse events, related serious adverse events (deemed attributable to study participation), pain (assessed on an 11-point visual-analogue scale, with higher scores indicating more severe pain), return emergency department visits, hospitalizations, and diagnostic accuracy.A total of 2759 patients underwent randomization: 908 to point-of-care ultrasonography, 893 to radiology ultrasonography, and 958 to CT. The incidence of high-risk diagnoses with complications in the first 30 days was low (0.4%) and did not vary according to imaging method. The mean 6-month cumulative radiation exposure was significantly lower in the ultrasonography groups than in the CT group (P<0.001). Serious adverse events occurred in 12.4% of the patients assigned to point-of-care ultrasonography, 10.8% of those assigned to radiology ultrasonography, and 11.2% of those assigned to CT (P=0.50). Related adverse events were infrequent (incidence, 0.4%) and similar across groups. By 7 days, the average pain score was 2.0 in each group (P=0.84). Return emergency department visits, hospitalizations, and diagnostic accuracy did not differ significantly among the groups.

The shortcoming of the study is small sample size.

## CONCLUSION

Authors found that echo results were found to be marked, slight and indistinct. With little loss of specificity, the color doppler enhances renal and ureteral stone detection, diagnostic confidence, and overall accuracy.

## REFERENCES

1. Pinto A, Caranci F, Romano L, Carrafiello G, Fonio P, Brunese L: Learning from errors in radiology: a comprehensive review. Semin Ultrasound CT MR. 2012; 33: 379-82.
2. Lee JY, Kim SH, Cho JY, Han D: Color and power Doppler twinkling artifacts from urinary stones: clinical observations and phantom studies. AJR Am J Roentgenol. 2001; 176: 1441-5.
3. Frymoyer PA, Scheinman SJ, Dunham PB, Jones DB, Hueber P, Schroeder ET. X-linked recessive nephrolithiasis with renal failure. N Engl J Med. 1991; 325: 681-6.
4. Leumann EP. Primary hyperoxaluria: an important cause of renal failure in infancy. Int J Pediatr Nephrol 1985; 6: 13-6. 5. Gambaro G, Favaro S, D'Angelo A. Risk for renal failure in nephrolithiasis. Am J Kidney Dis 2001; 37: 233-43.
5. Foley RN, Collins AJ. End-stage renal disease in the United States: an update from the United States Renal Data System. J Am Soc Nephrol. 2007; 18: 2644-8.
6. Sheafor DH, Hertzberg BS, Freed KS, Carroll BA, Keogan MT, Paulson EK, et al. Nonenhanced helical CT and US in the emergency evaluation of patients with renal colic: prospective comparison. Radiology. 2000; 217: 792-7.
7. Aytac SK, Ozcan H: Effect of color Doppler system on the twinkling sign associated with urinary tract calculi. J Clin Ultrasound. 1999; 27: 433-9.
8. Kane RA, Manco LG: Renal arterial calcification simulating nephrolithiasis on sonography. AJR Am J Roentgenol. 1983; 140: 101-4.
9. Ramello A, Vitale C, Marangella M. Epidemiology of nephrolithiasis. J Nephrol. 2000; 13:45-50.
10. Coresh J, Selvin E, Stevens LA, Manzi J, Kusek JW, Eggers P, et al. Prevalence of chronic kidney disease in the United States. J. Amer. Dent. Assoc. 2007; 298: 2038-47.
11. Mitterberger M, Aigner F, Pallwein L, Pinggera GM, Neururer R, Rehder P, Frauscher F. Sonographic detection of renal and ureteral stones: value of the twinkling sign. International braz j urol. 2009;35:532-41.
12. Kanno T, Kubota M, Sakamoto H, Nishiyama R, Okada T, Higashi Y, Yamada H. The efficacy of

ultrasonography for the detection of renal stone. Urology. 2014 Aug 1;84(2):285-8.
13. Smith-Bindman R, Aubin C, Bailitz J, Bengiamin RN, Camargo Jr CA, Corbo J, Dean AJ, Goldstein RB, Griffey RT, Jay GD, Kang TL. Ultrasonography versus computed tomography for suspected nephrolithiasis. New England Journal of Medicine. 2014 Sep 18;371(12):1100-10.