

Detection Of Renal Stones By Ultrasonography

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ABSTRACT

Background: Kidney stones also known as renal stones are hard deposits made of minerals that develop in the urinary system or kidneys. Numerous symptoms, including excruciating pain in the lower back, abdomen, or groin, nausea, and vomiting, can be brought on by renal stone. **Objective:** To evaluate the accuracy of ultrasonography for the presence, location, and site of stones in patients with acute renal colic. **Methods:** This research was conducted in the radiology department of the Jalal Pur Diagnostic Centre. Data were acquired from October 2022 to March 2023. 100 patients were included in the study. Patient-informed permission was acquired following the ethical standards outlined by the research committee. **Results.** The study shows that 74% of patients have unilateral renal stones while 26% have bilateral renal stones. About 43 people had urolithiasis on the left side. The majority of stones were present in the lower pole of the kidney. **Conclusion:** Ultrasonography can be utilized as a primary evaluation technique in patients presenting with acute renal colic. Males are most commonly affected by renal stones than females and patients between the ages of 31 and 45 are the most usually affected.

Keywords: Kidney stones , Renal Calculi , and Ultrasonography

Article Information

Received: May 8, 2023; Revised: May 30, 2023; Online: July 31, 2023

INTRODUCTION

Kidney stones are also known as renal calculi, nephrolithiasis, or urolithiasis.¹ Kidney stones are caused by an imbalance in the solubility of salts.² Stones may form if there are too many crystal-forming substances in the urine that cannot be dissolved.³ Stone formation may be facilitated by high urine excretion of several chemicals, such as calcium, oxalate, uric acid, and cysteine.⁴ Kidney stones can injure the bladder, kidneys, and other parts of the body.⁵ There are four main types of kidney stone deposits: calcium (75–85%) (calcium oxalate and calcium phosphate)⁶, struvite (2–15%)⁷, uric acid (6–10%)⁸, and cystine stones (1–2%)⁹. The size of kidney stones can vary from a few millimeters to several centimeters from the size of a golf ball to a particle of sand.¹⁰

According to previous studies 5–15% of people worldwide are affected by nephrolithiasis^{11, 12}, and the recurrence rate is greater than 50%.^{13, 14} According to the global journal for research analysis, more than 70%

of stones affect adults between the ages of 30 and 60¹⁵ and males are more affected than females.¹⁶ A previous study published by WM Alhassan published in 2016 said that kidney stones are most commonly found in the lower

pole of the kidney.¹⁷ Deaths caused by stones are uncommon however some types of stones such as staghorn calculus have a high risk of renal failure (28%).¹⁸ According to Goldsmith ZG kidney stones with a diameter of 7mm or more require urological intervention, whereas kidney stones with a diameter of 5mm or less have a reasonable chance of passing on their own.¹⁹ The individuals who have diabetes, irritable bowel syndrome, nephrolithiasis in the family, obesity, hyperparathyroidism, or hypertension are more likely to develop renal calculi.²⁰ If renal stones remain untreated they can cause hydronephrosis, chronic kidney disease, urinary tract infection with renal obstruction, and sepsis.²¹ When a kidney stone lodges in the ureters, the flow of urine can be restricted, the kidneys can become inflamed, and the ureters can spasm, all of which can be excruciatingly painful.²² Repeated instances of urinary tract blockage brought on by stones may potentially be a factor in the gradual deterioration of renal function.²³

The purpose of this study is to diagnose and evaluate kidney stones using ultrasonography. Ultrasound can be used to detect kidney stones and determine their size, location, and number. This study will help in the early detection of kidney stones and determine the prevalence of kidney stones in different age groups. The information obtained from ultrasonography can assist medical professionals in choosing the best treatment for the patient, which may include medication, lithotripsy, or surgical removal of the stones

MATERIAL AND METHODOLOGY

It is a cross-sectional research carried out in a diagnostic center in Jalalpur. The data was considered retrospectively from November 2022 to March 2023. A sample size of 100 was considered following a previously

published study.²⁴ The data was collected using a convenient sampling approach after informed consent and following ethical guidelines described by the research committee of the university. The study included all males and females who came to the radiology department with signs of acute renal colic and patients who were unwilling to participate, uncooperative, pregnant, had renal failure or had an infection of the urinary tract were excluded from the research. Data was entered and analyzed using SPSS version 24 after being documented on a proforma. A consultant radiologist performed ultrasounds on individuals who had renal colic symptoms using an ultrasound machine Toshiba equipped with 3.5, 5, and 7.5 MHz probes. Probe is positioned near the right midaxillary line at 11 o'clock for the right kidney using the liver as a window and is slightly angled posteriorly (toward the kidney). The patient is positioned in the right lateral decubitus posture or a supine position for the left kidney. Put the probe at the hour mark in the lower intercostal area. A mindray and a Toshiba usg machine were the tools employed.

RESULTS

The current investigation was carried out in a Jalal Pur Diagnostic Centre with a sample of 100 individuals who came to the ultrasound department for abdominal ultrasonography. Males and females ranging in age from 5 to 75 were included in the study. Patients between the ages ranging from 31 to 45 years are most commonly affected as shown in Table 1. 74% of patients had unilateral kidney stones and 26% had bilateral stones. 26% of stones are found in the lower pole of the kidney as shown in Table 2. 36 individuals had left-sided urolithiasis whereas 25 had the condition on the right side.

Table 1: Illustrates the age and gender frequency

Age	Frequency	Percent	Gender	Frequency	Percent
5-15	4	4.0	male	62	62.0
16-30	33	33.0	female	38	38.0
31-45	39	39.0	total	100	100.0
46-60	13	13.0			
61-75	11	11.0			
total	100	100.0			

Table 2: Illustrates the frequency of stone size and location

Stone size	Frequency	Percent	Stone location	Frequency	Percent
R 2-8mm	25	25.0	Upper pole	17	17.0
L 2-8mm	36	36.0	Mid pole	23	23.0
R 9-16mm	6	6.0	Lower pole	26	26.0
L 9-16mm	7	7.0	Renal pelvis	9	9.0
R 0-4mm+L 0-5mm	11	11.0	Upper +mid- pole	13	13.0
R 0-9mm+L 0-9mm	15	15.0	Mid-+lower- pole	12	12.0
Total	100	100.0	Total	100	100.0

Table 3 illustrates the frequency of involvement of the kidney

Involvement of kidney	Frequency	Percent
Unilateral	74	74.0
Bilateral	26	26.0
Total	100	100.0

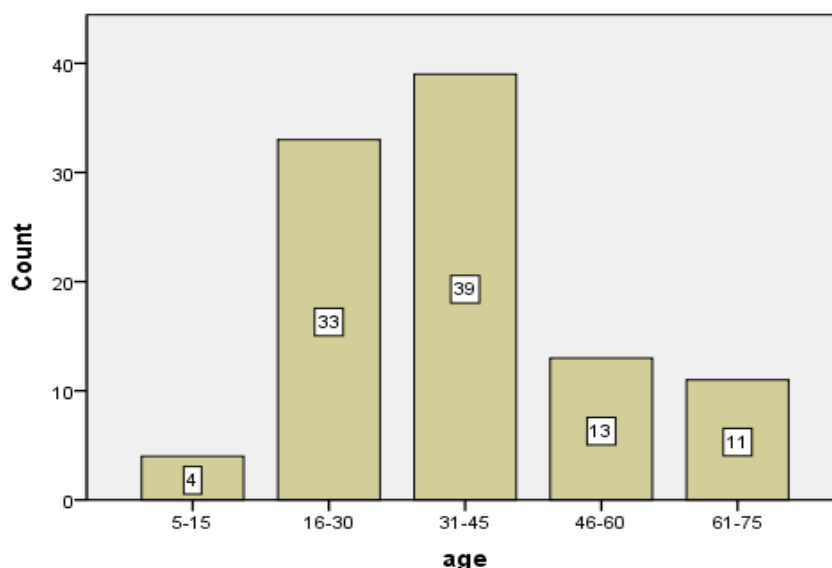


Figure 1: Represent age frequency

The above bar graph shows that 4 patients were between the ages of 5 to 15, 33 between the ages of 16 to 30, 39 between the ages of 31-45, 13 between the ages of 46-60 and 11 were between the ages of 61-75

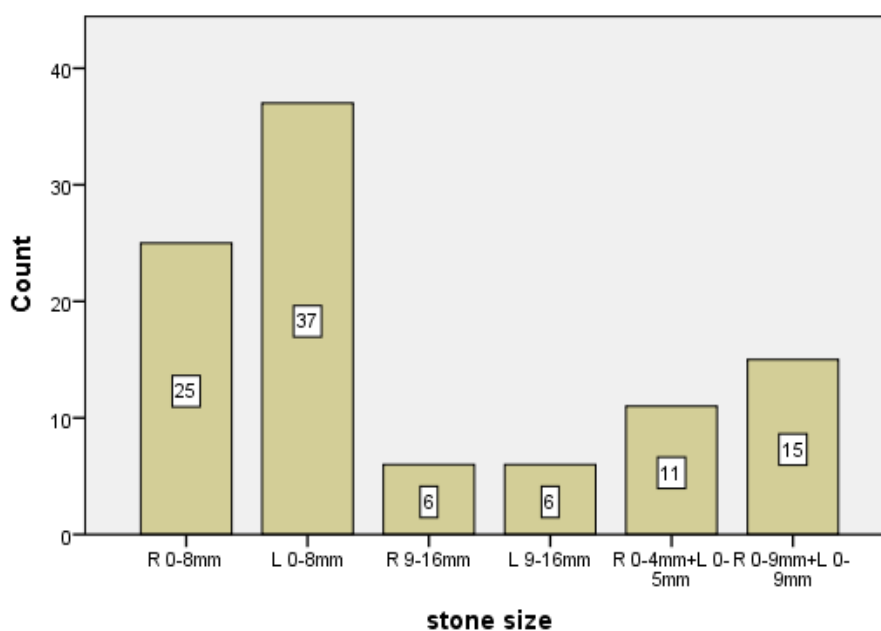


Figure 2: Represent the frequency of stone size

The above bar graph shows that 31 had right-sided urolithiasis and 43 patients had left-sided urolithiasis. It shows that the majority of stones were between the range of 0-8mm. It also reveals that 26 patients had bilateral urolithiasis.

DISCUSSION

Calcium salts are the main component of the great majority of renal calculi. The most typical form of stone is calcium oxalate, followed by calcium phosphate stones.²⁵ The primary risk factor for the development of

calcium stones is an increase in the excretion of calcium and oxalate (hypercalciuria and hyperoxaluria, respectively). Approximately one in ten persons may get kidney stones at some point in their lives, which means that they are still a fairly frequent condition.²⁶ 10-

12% of people in developed nations suffer from urinary stones.²⁷ Some medical conditions, such as the ketogenic diet, dietary deficiency, the inclusion of foods rich in oxalate crystals, and post-operative abnormalities increase the likelihood of kidney stone difficulties. Ultrasonography can identify the size, position, and form of kidney stones.

Larger renal stones with posterior acoustic shadowing can be detected with high accuracy by ultrasonography.²⁸ Urinalysis is a quick and accurate way to identify kidney stones, however, it does not indicate the stone's size or location. The history, physical exam, current symptoms, blood biochemistry, and imaging profile are used to make the diagnosis of renal calculi. In the current study, 100 patients were included with 4 patients between the ages of 5 and 15, 33 patients between the ages of 16 and 30, 39 patients between the ages of 31 and 45, 13 patients between the ages of 45 and 60, and 11 patients between the ages 60 and 75.

A previous study by GS Sarla published in 2018 had similar results that individuals between the ages of 31-40 are more commonly affected by renal stones.²⁹ Another study, done by PW Eggers, established in 2013 showed the same results that males are more commonly affected by kidney stones than females.³⁰ According to research in the Journal of Urology, developing kidney stones is connected with higher urine calcium excretion.³¹ A study done by DJB Mohammad also said that left-sided urolithiasis is more common than the right side.³² In the study, we observed that kidney stones are seen in 74 individuals unilaterally and bilaterally in 26 patients.

CONCLUSION

Ultrasonography is a first-line diagnostic method for renal stones due to its excellent

diagnostic accuracy. The study found that males are more frequently affected by urolithiasis and the majority of stones are present in the lower pole of the kidney. The age group which is most commonly affected by urolithiasis is between the range of 31-45 years.

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