

## FREQUENCY OF RENAL STONE DISEASE IN PATIENTS WITH URINARY TRACT INFECTION

Hizbullah Jan, Ismail Akbar\*, Haider Kamran\*, Jehangir Khan

Surgical Unit, DHQ Hospital Charsadda, Department of Surgery, Ayub Medical College, Abbottabad.

**Background:** To determine incidence of renal stone disease in patients with urinary tract infection, this cross sectional study was conducted at Surgical Unit of District Head Quarters Hospital, Charsadda over a period of one year from January to December 2005. **Methods:** One hundred consecutive patients were enrolled in this study. All those patients who presented with urinary symptoms were included. While patients with lower urinary tract stones, upper urinary tract stones with renal failure, renal tumours and previous history of renal stones disease were excluded. The data was obtained and analyzed by filling a specially designed proforma for each patient. **Results:** All 100 patients were between age ranges of 15–60 years (Mean age 37.5 years). Infection was present in 79% of cases. The commonest organisms isolated according to culture report were E. Coli (30%), Proteus (19%), Klebsiella (11%), Pseudomonas (7%), Staphylococcus aureus (3%) etc. The frequency of renal stone disease in patients with urinary tract infection was 18.98%. (12.6% in male and 6.3% in female). Mean age of patients with renal stones was 31.26 years and male to female ratio was 1.5:1. **Conclusion:** Renal stone disease makes an important group among urinary stone diseases. Urinary tract infection with certain bacteria plays an important role in the synthesis of renal stones. A high incidence can be prevented by adopting a variety of simple conservative measures.

**Key words:** Renal stones, Urinary tract infection, E. Coli, Incidence.

### INTRODUCTION

Renal stone disease has been recognized in many parts of the world since antiquity. It is one of the most painful and commonest urological disorders. The evidence of urinary calculi (presumably bladder) has been found in 7000 years old Egyptian mummy.<sup>1</sup> Its incidence has increased considerably during the 20<sup>th</sup> century.

Pakistan is included in the stone belt region, where a consistently high incidence of urolithiasis has been reported.<sup>2</sup>

The commonest type of stones contains calcium in combination with either oxalate or phosphate. Calcium oxalate and calcium phosphate make up at least 80% of all kidney stones.<sup>3</sup> Infection stones are composed of struvite (magnesium ammonium phosphate) or carbonate apatite crystals. Infection stones make up approximately 15% of urinary stone diseases.<sup>4</sup> Stones associated with infections are not only infection stones but also other kinds of stones such as calcium oxalate. So any type of stone may become infected, but the term 'infection stones' means that stone formation exclusively depends on Urease producing bacteria. Non-Urease producing bacteria may also be responsible for the synthesis of infection stones.

Uric acid, cystine and mixed type of stones make up rest of the urinary stones.

### MATERIALS AND METHOD

This cross sectional study was carried out on consecutive 100 patients, both from outdoor of surgical unit and emergency department of DHQ hospital

Charsadda, over a period of one year from January 2005–December 2005.

Both male and female patients with age range of 15–60 years, with urinary symptoms were included. While patients with lower urinary tract stone disease, renal stone disease with renal failure, renal tumours and previous history of renal stones were excluded.

A specially designed proforma, containing general information about the patient, urinary symptoms and signs, was filled for every patient included in this study. After clinical examination every patient was investigated in this manner.

#### Urine Analysis

Midstream urine was collected in a sterilized wide mouthed container after necessary precautions.

After physical examination for colour, a commercially available reagent strip (Uric 3.V, Uricon Biotec Korea) was used for the detection of pH, proteins and sugar in urine. Then microscopy was done for the detection of pus cells, red blood cells, epithelial cells and crystals. In case of pyurea, urine was cultured for 24 hours on standardized blood Agar or Mac-Conkey Agar, at a temperature of 37 °C for the growth of microorganisms. The sensitivity was tested by the commercially available antibiotic discs.

#### Imaging

The plain abdominal film was the first imaging test in the evaluation of the patients with urinary symptoms.

Ultrasonography was advised with emphasis on urinary tract system, for the detection of hydronephrosis, site and size of radiopaque shadow, parenchymal thickness and structural abnormalities.

Intravenous urogram was advised only in those patients, in whom plain x-ray abdomen was inconclusive or in preparation for renal stone surgery. After standard preparation, Urograffin 76% (0.1 gm Sodium Amido Trizoate and 0.66 gm Meglumine Amidotrizoate in aqueous solution) was used. Prior to administration of Urograffin, any history of allergy, asthma or previous exposure with untoward effects was considered.

**Blood Examination**

For the detection of renal functions blood urea, serum creatinine and serum electrolytes were performed. Tests for serum calcium and serum uric acid were performed in order to identify hypocalcaemia and hyper-urecaemia.

**Data Analysis**

The data analysis was computer based and software SPSS version 10 was used. The different statistical tests used for data analysis were range, ratio, percentage, proportion, mean, and median.

**RESULTS**

In this study over a period of one year, consecutive 100 patients with urinary symptoms were studied. Patients included were above 14 years, with age range of 15–60 years old. Mean age of patients with urinary symptoms was 37.5 years, with median age of 42 years while mean age of patients with renal stone disease was 31.26 years and median age was 35 years respectively (Table-1).

There was a slight male preponderance in patients with renal stone disease. Among them 9 were male and 6 were female with ratio of 1.5:1 (Figure-1).

Urinary pH was high (>7) in 20% of cases while in 80% of cases, the urine pH was acidic (4–4.5).

Infection was present in 79% of cases while 21% were having no infection (Figure-2). The commonest organisms isolated according to culture report were E. Coli (30%), Proteus (19%), Klebsiella (11%), Pseudomonas (7%), Staphylococcus aureus (3%).

Haematuria was present in 28% of cases. Both gross and microscopic haematuria was present in 15% of cases. While in rest of 13%, haematuria was microscopic only. Associated bacterial pyurea was present in 18% of cases. So in 10% of cases haematuria was present alone.

Crystalluria was present in 11% of cases. The commonest crystals identified were calcium, oxalate, phosphate and urate.

Out of 79 patients with urinary tract infection 15 patients were having renal stone disease. So the frequency of renal stones disease in patients with urinary tract infection was 18.98 % (Figure-3). The frequency among male patients was 12.6% while 6.3% in female patients.

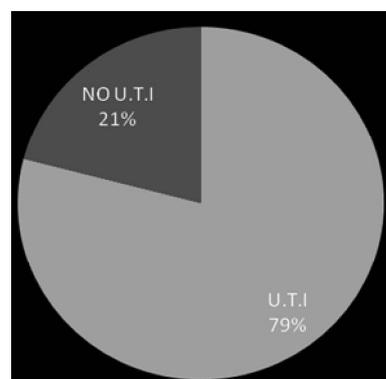
In 93.4% of cases stones were unilateral. In 60% of cases, the stones were on the left side while 33.4% of the stones were on the right side and bilateral stones were present only in 06.6%. Staghorn calculi were in 13.2% of cases. (Table-2).

**Table-1: Age wise Distribution in patients with renal stones (n=15)**

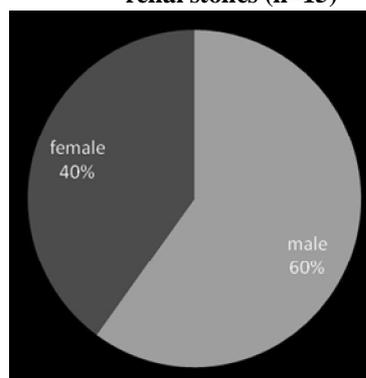
Age in years	No. of patients	%age
15 – 25	5	33.3%
26 – 40	7	46.7%
41 – 60	3	20%

**Table-2: Sidewise distribution of renal stones (n=15)**

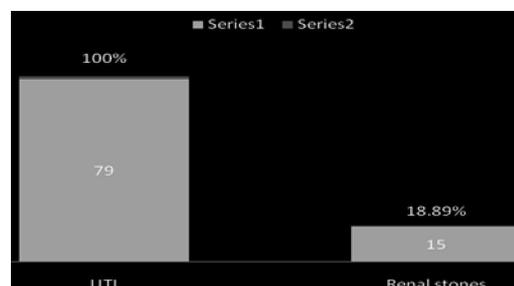
Side	No. of Patients	%age
Left	9	60.0%
Right	5	33.4%
Bilateral	1	06.6%



**Figure-1: Sex wise Distribution in patients with renal stones (n=15)**



**Figure-2: UTI in patients with urinary symptoms (n=100)**



**Figure-3: Frequency of renal Stones in Patients with UTI**

## DISCUSSION

Nephrolithiasis has tormented and vexed mankind for many years. In Pakistan and in other developed countries, change over from bladder calculi to upper urinary tract is on constant rise. Pakistan is included among those countries where incidence and prevalence of this disease is high.<sup>5</sup>

T. Ogata *et al*<sup>6</sup> performed a study in which renal stones were mostly seen in 3<sup>rd</sup> and 4<sup>th</sup> decades of life. The results are similar to my study in which majority of patients with renal stones were between 30–40 years.

There was a slight male preponderance. The male to female ratio was 1.5:1. These results are comparable with the observations made by M. Okuyama.<sup>7</sup> According to his study the frequency of male to female ratio of upper and lower urinary tract stones were 1.68:1 and 2.25:1 respectively. But the observations made by Rajput PA *et al*; in Baluchistan was male to female ratio of 4:1, which shows a high male preponderance.<sup>8</sup>

Alteration in urinary PH also plays an important role in the synthesis of renal stones, because in certain stones, the PH is specific. In struvite stones, the urine remains alkaline for a long period and over saturate with the ions which promotes struvite stone formation. In 20% of cases high urinary pH (>7) was observed in this study. F. Barbey *et al*, made similar observations of high urinary PH (>7.2) required for the synthesis of struvite stones.<sup>9</sup>

In this study 13.2% of cases, had radiological evidence of Staghorn stones. P. Rieu has reported 2-3% of staghorn stones.<sup>10</sup>

The urinary tract infection was present in 79% of cases. While the observed frequency of renal stones in this study was 18.98% in patients with urinary tract infection. Huchereiter W<sup>3</sup> and Bichler KH<sup>4</sup>, showed a frequency of 10–15% of infection stones.

In 93.4% of case renal stones were unilateral. 60% on the left side, 33.4% on the right side and 6.6% bilaterally. Similar observations were made by Buchholz *et. al*<sup>11</sup>, which showed that most stones were in the left kidney.

## CONCLUSION

Urolithiasis involving the upper urinary tract is a multifactorial disease. A variety of intrinsic and extrinsic factors influence the incidence of disease in individuals and in all populations. Persistent Urinary tract infection with urea splitting or non- splitting bacteria may be the initial factors in the synthesis of infection renal stones.

In metabolic stones bacterial superimposition may be responsible for the recurrent urinary tract infections. By controlling urinary tract infection, metabolic causes and other risk factors can lead to considerable decrease in the incidence of Nephrolithiasis in this area.

## REFERENCES

1. Sami-ullah, Chaudary A Ishtiaq, Masood R. A comparison of open vesicolithotomy and cystolithotomy. Pak J Med Sci. 2007;23(1):45–50.
2. Shoaib M, Zafar Z. Comparison of 24 hours urinary citrate level in urolithiasis patients and healthy controls. J Pak Med Assoc 2005;(55):371.
3. W Hochreiter, T Knoll, B Hess. Pathophysiology, diagnosis and conservative therapy of non-calcium kidney calculi. Ther Usmach 2003;60(2):89–97.
4. KH Bichler, E Eipper, K Naber. Infection induced urinary stones. Urologe A. 2003;42(1):47–55.
5. M Menon, MI Resick. Urinary lithiasis, etiology, diagnosis and medical management. In: Relick AB, Vaughn ED, Ween AJ, editors. Campbell's Urology 8<sup>th</sup> edition. Saunders; London 2002. p 3229–35.
6. T Ogata, K Akakura, K Mizoghuchi, K Mikami, K Nozumi, H Ito. Annual changes of the incidence and clinical characteristics of magnesium ammonium phosphate urinary stones. Int J Urol. 2003;10(10):1–5.
7. M Okuyama, M Nishara, M Kunieda, H Fujii, Y Kato, S Yamaguchi *et al*. Epidemiological characteristics of urolithiasis in Okhotsk coast area in Hakkaido. Hinyokika kyo. 2004 Sep;50(9):599–603.
8. Rajput PA, Saadat K, Khan Din S, Nawaz Haq MS. Present trend of urolithiasis in Baluchistan: A single centre experience. J Coll Phys Surg Pak. 2002;12(10):615–22.
9. Barbey F, Cachot F, Halabi G, Jichlinski P, Dandon M. Infection lithiasis. Rev Med Suisse Romando. 2004;124(8):465–9.
10. P Rieu. Infective lithiasis. Ann urol (Paris). 2005;39(1):16–29.
11. Buchholz NPN, Abbas F, Afzal M, Khan R, Rizvi L, Talati J. The prevalence of silent kidney stones. An ultrasonographic study. J Pak Med Assoc. 2003;53(1):24–5.

### Address for correspondence:

**Dr. Hizbullah Jan**, Polyclinic Hospital, ESSI, NWFP, Near City Hospital, Kohat Road Peshawar, Pakistan. **Cell:** +92-333-9323751.

**Email:** hizbullahsgr@hotmail.com