



ISSN : 2347 - 2243

*Indo - American Journal of
Life Sciences and Biotechnology*



www.iajlb.com

Email : editor@iajlb.com or iajlb.editor@gmail.com



Demographic and Clinical Profile of Ureteric Calculi at a Tertiary Care Hospital in Saurashtra, Gujarat: A Hospital-Based Observational Study

Dr. Vishalkumar D. Patel^{1*}, Dr. Manish M. Mudgal², Dr. Khyati P. Vaghela³

^{1*,3}Resident, Department of General Surgery, C.U. Shah Medical College, Surendranagar, Gujarat, India.

²Assistant Professor, Department of General Surgery, C.U. Shah Medical College, Surendranagar, Gujarat, India.

Corresponding Author: Dr. Vishalkumar D. Patel

Resident, Department of General Surgery, C.U. Shah Medical College, Surendranagar, Gujarat, India.

Email: Vishalpatel31298@gmail.com

Received: 07.09.26, Accepted: 10.10.26

ABSTRACT

Background: Ureteric calculi are an important cause of acute urological presentations, with clinical manifestations ranging from colicky pain to urinary tract obstruction. This study evaluated the demographic and clinical profile of patients with ureteric calculi at a tertiary care hospital in Saurashtra, Gujarat.

Material and Methods: This hospital-based observational study included 100 patients with ureteric calculi. Demographic characteristics, presenting symptoms, laboratory parameters, urine culture results, and imaging and endoscopic findings were assessed using descriptive statistics.

Results: Among the 100 patients, 75% were male, and the most common age group was 20–30 years (37%). Right-sided calculi occurred in 48% of patients, left-sided calculi in 46%, and bilateral calculi in 6%. Colicky abdominal pain (90%) was the predominant symptom, followed by burning micturition (30%). Urine analysis showed an alkaline reaction in 72% of patients. Red blood cells and pus cells were detected in 76% and 58%, respectively. Urine cultures showed no growth in 44% of samples, while *Escherichia coli* was the predominant isolate (30%). Ultrasonography revealed mild, moderate, and severe hydronephrosis in 10%, 5%, and 2% of patients, respectively. Among patients undergoing intravenous urography (n = 33), hydronephrosis with hydroureter was observed in 51.51%. Cystoscopy (n = 31) revealed normal findings in 80.64%.

Conclusion: Ureteric calculi predominantly affected males and young adults in this cohort. Colicky abdominal pain was the most frequent presenting symptom, while haematuria, urinary inflammatory findings, and upper urinary tract dilatation were notable clinical and investigative features.

Keywords: Ureteric Calculi, Urolithiasis, Demographic Profile, Urine Culture, Hydronephrosis, Observational Study.

INTRODUCTION

Urolithiasis is a common urological disorder associated with substantial



morbidity and healthcare utilization. Its epidemiological distribution varies across geographical regions and populations, reflecting differences in demographic characteristics, environmental exposures, dietary habits, and metabolic risk factors. Recent epidemiological studies have demonstrated considerable variation in the global burden of urinary stone disease, emphasizing the importance of region-specific investigations to understand its distribution and clinical characteristics [1, 2]. An umbrella review published in 2024 identified several potential risk factors for nephrolithiasis, including central obesity, type 2 diabetes mellitus, dietary sodium, and fructose intake, highlighting the multifactorial nature of stone formation [3]. Ureteric calculi represent an important clinical manifestation of urinary stone disease and may produce acute ureteric colic, urinary tract obstruction, and hydronephrosis. The clinical presentation varies according to stone location, degree of obstruction, and associated urinary tract pathology. A systematic review and meta-analysis reported that individual symptoms, physical findings, and microscopic haematuria have limited diagnostic value when considered independently in patients with suspected renal colic, supporting the need for appropriate imaging and clinical assessment [4]. When obstruction is accompanied by urinary tract infection, the risk of serious complications increases, making timely identification and assessment of affected patients particularly important [5].

The evaluation of patients with ureteric calculi therefore requires a comprehensive assessment of demographic characteristics, presenting symptoms, laboratory parameters, urine culture findings, and radiological features. Studies conducted in Indian populations have also explored the epidemiology and risk factors of urinary stone disease, indicating the relevance of

investigating patient characteristics within the local healthcare setting [6]. However, findings from broader epidemiological studies may not fully reflect the clinical profile of patients presenting to individual tertiary care hospitals.

In this context, the present study was undertaken to assess the demographic and clinical profile of patients with ureteric calculi at a tertiary care hospital in Saurashtra, Gujarat. The study evaluated patient demographics, presenting symptoms, laboratory and urine culture findings, and imaging and endoscopic features to characterize the clinical spectrum of ureteric calculi in this hospital-based population.

MATERIALS AND METHODS

Study design and setting

This hospital-based observational study was conducted in the Department of General Surgery at C. U. Shah Medical College and Shrimad Rajchandra Sarvamangal Hospital, Surendranagar, Gujarat, India, a tertiary care teaching hospital. The study period was March 2024 to March 2025. The protocol was approved by the Institutional Scientific Committee and the Institutional Ethics Committee [CUSMC/IEC(HR)/DI/59/2024/Final Approval/185/2024; Dated:23/07/2024]. Written informed consent was taken from all participants.

Study population

Patients who attended the outpatient department with clinical features suggestive of ureteric calculi and who were investigated, diagnosed and treated at the hospital during the study period were included. All diagnosed cases of ureteric stones were eligible, and no exclusion criteria were applied. The sample size was 100 consecutive cases.

Clinical evaluation and data collection



Each patient underwent a detailed clinical evaluation, and data were recorded on a predesigned proforma. The proforma captured demographic details (age and sex), presenting symptoms, laterality of the stone (right, left or bilateral), and the results of the investigations described below.

Laboratory investigations

Urine analysis included the reaction (alkaline or acidic) and microscopy for red blood cells, pus cells, epithelial cells and crystals. Urine culture and sensitivity were performed, and the isolated organisms were recorded. Blood investigations included haemoglobin, total leucocyte count, blood urea and serum creatinine.

Imaging and endoscopic evaluation

Plain X-ray of the kidneys, ureters and bladder (KUB) and ultrasonography of the abdomen and pelvis were performed in all patients. On ultrasonography, the presence and degree of hydronephrosis were recorded and graded as mild, moderate or severe. Intravenous urography (IVU) was performed in 33 patients who required surgical intervention, to assess renal function, the exact location of the stone and associated changes such as hydronephrosis, hydroureter and calyceal clubbing. IVU was not performed in patients with serum creatinine of 2 mg/dL or more. Cystoscopic findings were recorded in 31 patients.

Statistical analysis

Data were entered in Microsoft Excel and analysed with SPSS software. Categorical variables are presented as frequencies and percentages while continuous variables as mean $\pm$ SD.

RESULTS

As shown in Table 1, males constituted 75% of the study population, compared with 25% females. The predominant age

group was 20–30 years (37%), followed by 30–40 years (22%). Right-sided calculi were observed in 48% of patients, left-sided in 46%, and bilateral involvement in 6%. Colicky abdominal pain was the most common presenting symptom (90%), followed by burning micturition (30%).

Table 2 summarizes the laboratory findings. Urine was alkaline in 72% of patients. Microscopy revealed red blood cells in 76%, pus cells in 58%, epithelial cells in 28%, and crystals in 27%. Haemoglobin levels were above 10 g/dL in 51% and below 10 g/dL in 49% of patients. Leukocytosis was observed in 18%, while elevated blood urea and serum creatinine levels were noted in 7% and 8%, respectively.

According to Table 3, urine cultures showed no growth in 44% of samples. *Escherichia coli* was the predominant isolate (30%), followed by *Klebsiella* (10%), *Pseudomonas* (8%), and *Proteus* (8%).

As presented in Table 4, ultrasonography revealed mild, moderate, and severe hydronephrosis in 10%, 5%, and 2% of patients, respectively. Among the 33 patients who underwent intravenous urography (IVU), good contrast concentration was observed in 78.78%, while poor concentration occurred in 6.06%. Clubbing of the calyces was noted in 15.15%, and hydronephrosis with hydroureter was the most frequent structural abnormality (51.51%). Hydroureter alone was observed in 9.09%, with no cases of non-visualization or delayed excretion of contrast. Among the 31 patients undergoing cystoscopy, findings were normal in 80.64%. An edematous ureteral opening was observed in 9.67%, cystitis in 6.45%, and trabeculations in 3.22%. A stone at the ureteral opening was also reported (Table 4).



Table 1. Demographic and clinical characteristics (N = 100)

Characteristic	No. of cases	Percentage
Sex		
Male	75	75%
Female	25	25%
Age (years)		
1-10	00	0%
10-20	07	7%
20-30	37	37%
30-40	22	22%
40-50	13	13%
50-60	15	15%
60-70	05	5%
>70	01	1%
Laterality		
Right	48	48%
Left	46	46%
Bilateral	06	6%
Presenting symptoms		
Colicky abdominal pain	90	90%
Burning micturition	30	30%

Table 2. Laboratory findings

Parameter	No. of cases	Percentage
Reaction of urine (n = 100)		
Alkaline	72	72%
Acidic	28	28%
Urine microscopy (n = 100)		
RBCs	76	76%
Pus cells	58	58%
Epithelial cells	28	28%
Crystals	27	27%
Blood investigations		
Hemoglobin >10 gm%	51	51%
Hemoglobin <10 gm%	49	49%
Leukocytosis	18	18%
Blood urea >20 mg%	7	7%
Serum creatinine >1.5 mg%	8	8%

Table 3. Urine culture (n = 100)

Organism	No. of cases	Percentage
<i>E. coli</i>	30	30%
<i>Klebsiella</i>	10	10%
<i>Pseudomonas</i>	8	8%
<i>Proteus</i>	8	8%



Organism	No. of cases	Percentage
No growth	44	44%

Table 4. Imaging and endoscopic findings

Finding	No. of cases	Percentage
Ultrasound: degree of hydronephrosis (n = 100)		
Mild	10	10%
Moderate	5	5%
Severe	2	2%
Intravenous urography (n = 33)		
Clubbing of calyces	5	15.15%
Concentration of contrast: good	26	78.78%
Concentration of contrast: poor	2	6.06%
Hydronephrosis with hydroureter	17	51.51%
Hydroureter only	3	9.09%
Non-visualization of contrast	0	0%
Delayed excretion of contrast	0	0%
Cystoscopy (n = 31)		
Edematous ureteral opening	3	9.67%
Cystitis	2	6.45%
Trabeculations	1	3.22%
Stone at the ureteral opening	1	6.45%
Normal	25	80.64%

DISCUSSION

The present study evaluated the demographic, clinical, laboratory, microbiological, and radiological characteristics of 100 patients with ureteric calculi at a tertiary care hospital in Saurashtra, Gujarat. The findings demonstrate a predominance of male patients, concentration of cases among young adults, frequent presentation with colicky abdominal pain, and variable urinary and imaging abnormalities.

Male patients accounted for 75% of the study population, indicating a marked male predominance. This finding is consistent with a recent observational study from Northeast India, in which males constituted 67.3% of patients with ureteric calculi, and another 2024 study of patients undergoing ureterorenoscopy, which reported a male proportion of 75.2% [7,8].

Differences in the magnitude of male predominance across studies may reflect variations in patient selection, regional characteristics, and healthcare-seeking patterns. In the present study, the 20–30-year age group represented the largest proportion of cases (37%), followed by the 30–40-year group (22%). This distribution suggests that ureteric calculi constituted a considerable clinical burden among young and middle-aged adults in the study population. However, as the study was hospital-based, these findings should not be interpreted as estimates of age-specific population incidence.

Right-sided calculi were observed in 48% of patients and left-sided calculi in 46%, while bilateral involvement occurred in 6%. The relatively similar proportions of right- and left-sided disease indicate no substantial laterality difference in this cohort. A 2025 hospital-based



observational study from Telangana also reported a similar distribution, with stones occurring on the left in 48%, on the right in 44%, and bilaterally in 8% of patients with urolithiasis [9].

Colicky abdominal pain was the predominant presenting symptom, reported by 90% of patients, while burning micturition occurred in 30%. The predominance of pain is consistent with the clinical presentation reported in recent observational studies. Kumar et al. documented flank pain in 87.1% of patients with ureteric calculi in Northeast India, while Baindla reported flank pain in 88% of patients with urolithiasis in a tertiary care setting [7,9].

The slightly higher proportion of pain in the present study may be attributable to differences in the inclusion criteria and the clinical characteristics of patients presenting to the respective hospitals. Burning micturition in nearly one-third of our patients also indicates the relevance of lower urinary tract symptoms in the clinical assessment of ureteric calculi. Nevertheless, symptom frequencies alone cannot establish the presence, location, or severity of obstruction.

Urine microscopy revealed red blood cells in 76% of patients, making haematuria the most frequent microscopic abnormality. This finding is clinically compatible with irritation or injury of the urinary tract associated with stone passage or impaction. A 2024 study of patients with obstructive pyelonephritis related to ureteral stones also reported frequent haematuria and pyuria, although its selected population with infection and obstruction limits direct comparison with the present cohort [10].

Pus cells were detected in 58% of our patients, suggesting that urinary inflammatory changes were common; however, pyuria alone does not confirm a bacterial infection. The alkaline urine reaction observed in 72% of patients is

another notable finding, although urine pH by itself cannot establish stone composition or a specific underlying mechanism.

Urine cultures yielded no growth in 44% of samples, while *Escherichia coli* was isolated in 30%, followed by *Klebsiella* species (10%), *Pseudomonas* species (8%), and *Proteus* species (8%). The predominance of *E. coli* among the isolates is consistent with the 2025 hospital-based study by Baindla et al., in which *E. coli* was the most frequently isolated organism among culture-positive patients with urolithiasis [9].

Nevertheless, the proportion of culture-positive patients varies with the study population, specimen collection, previous antimicrobial exposure, and the presence of associated infection. The detection of pus cells in more than half of our cohort despite no growth in 44% of cultures further highlights that microscopic inflammatory findings and culture positivity are not equivalent. The clinical significance of these findings should therefore be interpreted alongside symptoms, systemic signs, and renal function.

Haemoglobin levels below 10 g/dL were recorded in 49% of patients, while leukocytosis was observed in 18%. Elevated blood urea and serum creatinine were less frequent, affecting 7% and 8% of patients, respectively. These findings indicate that abnormalities in haematological and biochemical parameters were present in a subset of the study population. However, because baseline values and individual clinical correlations were unavailable, anaemia cannot be attributed to ureteric calculi, and elevated renal parameters cannot be assumed to result solely from stone-related obstruction.

Ultrasonography identified mild, moderate, and severe hydronephrosis in 10%, 5%, and 2% of the study population, respectively. Among the 33 patients who underwent



intravenous urography, hydronephrosis with hydroureter was reported in 51.51%, while hydroureter alone was observed in 9.09%. These findings demonstrate the occurrence of upper urinary tract dilatation among patients undergoing radiological evaluation. However, the IVU subgroup represented only part of the cohort, and its findings should not be directly compared with the full-cohort ultrasonography results without accounting for differences in patient selection and imaging indications. Contemporary research supports the importance of imaging in assessing ureteric calculi and associated obstruction. Uğur and Yağmur reported that ureteric stones could be managed effectively using ureteroscopy in appropriately selected patients, with stone location and size influencing clinical outcomes [8]. In addition, a 2025 prospective observational study from Kolkata investigated radiological and inflammatory parameters associated with spontaneous passage of mid- and lower-ureteric stones, underscoring the clinical relevance of imaging characteristics in evaluating ureteric calculi [11].

Cystoscopic findings were normal in 80.64% of the 31 patients examined. An edematous ureteral opening was observed in 9.67%, while cystitis and trabeculations were reported in smaller proportions. These findings suggest that visible abnormalities at cystoscopy were absent in most patients undergoing the procedure. Nevertheless, because cystoscopy was performed in a selected subgroup, the findings cannot be generalized to all 100 patients. The relatively small number of patients undergoing IVU and cystoscopy also limits the precision of comparisons across imaging and endoscopic findings.

The findings collectively emphasize the importance of combining clinical assessment with laboratory and radiological evaluation when investigating ureteric

calculi. Recent research has demonstrated associations between urinary stone characteristics, urine pH, and patient-related factors, although these relationships cannot be inferred from the present descriptive data because stone composition and individual-level associations were not assessed [12].

The present study has several limitations. Its hospital-based design and sample size of 100 patients limit the generalizability of the findings to the wider population of Saurashtra. Furthermore, the absence of information on stone size, anatomical location within the ureter, stone composition, treatment outcomes, and long-term recurrence restricts a more comprehensive assessment of disease characteristics. IVU and cystoscopy findings were available only for selected subgroups, further limiting direct comparisons. Future multicentre studies incorporating detailed stone characteristics, metabolic evaluation, antimicrobial susceptibility profiles, and follow-up outcomes may provide a more complete understanding of ureteric calculi in this region.

CONCLUSION

Ureteric calculi in this hospital-based series from Saurashtra, Gujarat, were a disease of young adults, with a clear male predominance. Colicky abdominal pain was the commonest presentation, and infection and alkaline urine accompanied the stone disease in a substantial proportion of patients. Plain X-ray KUB and ultrasonography are cost-effective first-line investigations, with IVU best reserved for patients planned for intervention. Routine urine culture and early imaging should therefore be part of the initial evaluation of every patient with ureteric colic. Larger multicentre studies, including metabolic evaluation and stone-composition analysis,



are needed to identify modifiable risk factors in this region.

REFERENCES

1. Abufaraj M, Al Karmi J, Yang L. Prevalence and trends of urolithiasis among adults. *Curr Opin Urol.* 2022 Jul 1;32(4):425-432. doi: 10.1097/MOU.0000000000000994.
2. Zhang L, Zhang X, Pu Y, Zhang Y, Fan J. Global, Regional, and National Burden of Urolithiasis from 1990 to 2019: A Systematic Analysis for the Global Burden of Disease Study 2019. *Clin Epidemiol.* 2022 Aug 15;14:971-983. doi: 10.2147/CLEP.S370591.
3. Ma Y, Cheng C, Jian Z, Wen J, Xiang L, Li H, et al. Risk factors for nephrolithiasis formation: an umbrella review. *Int J Surg.* 2024 Sep 1;110(9):5733-5744. doi: 10.1097/JS9.0000000000001719.
4. Dahm P, Koziarz A, Gerardo CJ, Nishijima DK, Jung JH, Benipal S, Raja AS. A systematic review and meta-analysis of clinical signs, symptoms, and imaging findings in patients with suspected renal colic. *J Am Coll Emerg Physicians Open.* 2022 Dec 1;3(6):e12831. doi: 10.1002/emp2.12831.
5. Yoo MJ, Pelletier J, Koyfman A, Long B. High risk and low prevalence diseases: Infected urolithiasis. *Am J Emerg Med.* 2024 Jan;75:137-142. doi: 10.1016/j.ajem.2023.10.049.
6. Singh S, Gupta S, Mishra T, Banerjee BD, Sharma T. Risk Factors of Incident Kidney Stones in Indian Adults: A Hospital-Based Cross-Sectional Study. *Cureus.* 2023 Feb 27;15(2):e35558. doi: 10.7759/cureus.35558.
7. Kumar S, Shitiri A, Alinger T. Evaluation and Management of Ureteric Calculi in a Secondary Care Hospital in Northeast India: An Observational Study. *Cureus.* 2025 Dec 19;17(12):e99678. doi: 10.7759/cureus.99678.
8. Uğur R, Yağmur İ. Urgent ureterorenoscopy as a primary treatment for ureteral stone: why not? *Urolithiasis.* 2024 Apr 23;52(1):69. doi: 10.1007/s00240-024-01569-0.
9. Baidla CP. Clinical Profile and Outcomes of Urolithiasis in Patients Attending a Tertiary Care Hospital: A Prospective Observational Study. *Journal of Surgical Radiology.* 2025;4(2):39-45. doi:10.61336/JSR/25-02-07
10. Hayano S, Hidaka T, Tadakuma R, Kashima M. Diagnostic accuracy of point-of-care Gram stains in obstructive pyelonephritis due to ureteral stones. *Open Forum Infect Dis.* 2024;11(3):ofae026. doi:10.1093/ofid/ofae026.
11. Chatterjee S, Mandal IP, Sarkar D. Radiological and Inflammatory Markers Predicting the Spontaneous Transit of Mid and Lower Ureteric Stones: A Prospective Observational Study. *Journal of Clinical and Diagnostic Research.* 2025;19(2):OC01-OC05.
12. Cheng WY, Tseng JS. Urinary stone analysis and clinical characteristics of 496 patients in Taiwan. *Sci Rep.* 2024;14:14115.