

**RESEARCH PAPER****ANALYSIS OF CLINICAL AND DEMOGRAPHIC CHARACTERISTICS OF PATIENTS PRESENTING WITH FEATURES OF UROLITHIASIS TO A DISTRICT BASE HOSPITAL IN SRI LANKA**

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**Abstract****Background**

A significant number of patients presenting with ureteric colic and other urinary symptoms have been observed at Rikillagaskada District Base Hospital, situated in the Nuwara-Eliya District, Sri Lanka.

**Materials and Methods**

Clinical and demographical features of a total of 116 patients presenting with features of urinary stone disease were analysed from May 2010 to December 2011.

**Results**

The mean age of the study sample was 46.61 years (SD=13.22) (range: 18-81 years). This included 72 (62.1%) males with a mean age of  $47.69 \pm 14.28$  years, while the mean age of females was  $44.84 \pm 11.21$  years. The major presenting symptom was flank pain (in 89.7 % of participants) , and dysuria (in 56% of participants). Forty two (36.2%) patients had a past history of ureteric colic.

**Conclusions**

Further studies with larger populations will be useful in further characterization of clinical and epidemiological data of the population.

**Keywords:** Urolithiasis, ureteric stones, renal stones, Sri Lanka



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## Background

Urolithiasis, also known as urinary calculosis, is the formation of stones (calculi) anywhere in the urinary tract (in the renal pyelocalyceal system, ureter, bladder or urethra). Urinary stone disease is a debilitating disease condition commonly affecting people worldwide. It affects 10% of the worldwide population over their lifetime<sup>1</sup>, and 2% to 5% of Asians have been found to develop renal stones in their lifetime<sup>2</sup>. Nephrolithiasis specifically refers to calculi in the kidneys. Although statistical data regarding the prevalence of nephrolithiasis in Sri Lanka has not been documented, the fact that annually almost 3000 patients are treated with Extracorporeal Shock Wave Lithotripsy (ESWL) at the National Hospital of Sri Lanka alone indirectly estimates the size of the disease burden in Sri Lanka<sup>3</sup>. The typical age of presentation of nephrolithiasis is found to be 20-60 years<sup>4</sup>, and its prevalence increases with age. In the absence of adequate medical management, the risk of stone recurrence in an individual is 40% within 3 years, 75% within 10 years, and 98% within 25 years<sup>5</sup>.

Renal colic which commonly manifests as flank pain, followed by abdominal pain, back pain, and groin pain, is one of the most severe pains to be managed at emergency departments<sup>6</sup>. Renal colic is the commonest manifestation of urolithiasis, followed by other symptoms such as nausea, vomiting, haematuria, dysuria, and urinary retention<sup>7</sup>.

Investigations done in patients with urolithiasis include imaging, urinalysis and metabolic evaluation. The two basic imaging investigations carried out in the hospital setting in patients presenting with features of urolithiasis are X-ray kidney-ureter-bladder (KUB) and ultrasound scan (USS) KUB. X-ray KUB, which is the most preliminary imaging investigation, includes

the entire urinary tract<sup>8,9</sup>. USS KUB is superior to X-ray KUB by the ability to visualize complications like hydronephrosis, in evaluating those with renal insufficiency or contraindications to use contrast media<sup>10,11</sup>. Urinalysis assesses the presence of red blood cells, and pus cells in urolithiasis. Metabolic evaluation is carried out in selected patients who present with 'red flag' features of urolithiasis, such as recurrent stone formation, presence of bilateral or multiple stones, or nephrocalcinosis, and a strong family history of urolithiasis<sup>12</sup>. Metabolic abnormalities have been found to be responsible for 97% of those with stone recurrence<sup>13</sup>.

Initial management of urolithiasis includes increase of fluid intake, dietary changes and correction of any underlying metabolic abnormalities. A fluid intake of at least two liters per day has been shown to reduce recurrence rate by half in temperate climates<sup>14</sup>. Further medical management by drugs like diuretics and urine alkalizing agents are used depending on the urine biochemistry. Thiazide diuretics have shown to reduce the risk of stone formation by half in hypercalciuric patients, by its mechanism of reducing urinary calcium<sup>15</sup>. About 10-20% of all nephrolithiasis may warrant surgical stone removal<sup>16</sup>. With advanced technology and improvement in imaging techniques, there has been a rapid progress in surgical treatment of urolithiasis over the past two decades. The surgical techniques of treatment of urolithiasis range from open surgical stone removal, percutaneous nephrolithotomy (PCNL), and extracorporeal shockwave lithotripsy (ESWL).

This study evaluated the clinical and demographic patterns, and risk factors of patients with urolithiasis. Investigations and treatment modalities carried out in a district level base hospital will also be assessed.

## Methodology

### Study Setting

We conducted a prospective cohort study on patients with urinary stone disease presenting to the Rikillagaskada District Base Hospital, where a significant number of patients presenting with ureteric colic and other urinary symptoms have been observed.

### Inclusion and Exclusion Criteria

A total of 116 patients presenting with features of urinary stone disease were analyzed from May 2010 to December 2011. Subjects included into the study were those who received the code for urolithiasis (N20-23) in accordance with the International Classification of Disease (ICD10). Patients below the age of 15 years, and those presenting with painless haematuria and other non-specific symptoms alone were excluded.

### Data Collection

Written permission was obtained from the director, District Base Hospital, Rikillagaskada. Data were collected by a trained medical officer using a questionnaire and a data sheet. Written informed consent was obtained from all participants prior to inclusion in the study. Socio-demographic data including age, sex, area of residence, and occupation of the patients were obtained. The pain of the ureteric colic was analyzed with reference to the time of onset, site, nature, severity, radiation, duration and response to analgesics and associated symptoms: haematuria, dysuria, fever, nausea, vomiting and urinary frequency. Details of past history of similar episodes of pain, diagnoses of urolithiasis, past treatments such as surgery and lithotripsy, risk factors such as family history, and nature of drinking water were obtained. Investigation

findings, including urine full report, full blood count, X-ray KUB and ultrasound KUB were obtained from each subject.



**Figure 1:** The base of a kettle used by the villagers



**Figure 2:** The coil of a heater used by the villagers

### Statistical Analysis

Data were entered to an excel data sheet, and was analysed using SPSS 20 (statistical package for social sciences 20.0). Univariate analysis was conducted initially and for selected variables a bivariate analysis was conducted thereafter.  $X^2$  test for nominal scale data was used to identify statistical significance. A probability of less than 0.005 was used to ascertain significance.



**Figure 3:** Water storage tanks used by the villagers

## Results

### Basic Demography and Epidemiology

All the study participants were from a remote village located in the central province of Sri Lanka. The study sample consisted of 116 clinically diagnosed patients with urolithiasis. The mean age of the study sample was 46.61 years (SD=13.22) (range: 18-81 years). This included 72 (62.1%) males with a mean age of  $47.69 \pm 14.28$ . The mean age of females was  $44.84 \pm 11.21$  years.

**Table 01:** List of common symptoms evaluated in both sexes

| Symptoms   | Total<br>n=116<br>n (%) | Male<br>n=72<br>n (%) | Female<br>n=44<br>n (%) | P value for<br>difference between<br>males and females |
|------------|-------------------------|-----------------------|-------------------------|--|
| Flank pain | 104 (89.7)              | 65(90.3)              | 39(88.6)                | 0.778  |
| Dysuria    | 65 (56.0)               | 45(62.5)              | 20(45.5)                | 0.073  |
| Nausea     | 50 (43.1)               | 28(38.9)              | 22(50.0)                | 0.241  |
| Haematuria | 25 (21.6)               | 18(25.0)              | 7(15.9)                 | 0.248  |
| Fever      | 28 (24.1)               | 18(25)                | 10(22.7)                | 0.781  |
| Vomiting   | 26 (22.4)               | 17(23.6)              | 9(20.5)                 | 0.692  |

The major presenting symptom was flank pain (side pain) in 89.7 % (n=104), and dysuria in 56% (n=65). *Table 01* gives a list of common symptoms extracted from the patients' charts and bed head tickets. Hundred and four (89.7%) patients presented with colicky pain suggestive of renal colic but the rest did not show similar

symptoms at presentation; and 36 (31%) were given pethidine for pain management. Out of 116, only 42 (36.2%) patients had a past history of ureteric colic.

*Table 02* demonstrates analysis of laboratory and radiological test results with regard to sex, presence of haematuria and flank pain. A urinary full report was ordered in almost all patients (95.68%) while X-ray KUB was obtained in 52.58% and USS-KUB in 50%.

*Table 03* demonstrates time of presentation to the OPD. A majority had presented in between 30 minutes to 120 minutes.

Of all patients, only 62(53.4%) used to drink boiled water. Visiting the residents to examine their water sources was done. (Figures 1 – 3). However, this could not be done systematically.

**Table 02:** Analysis of investigations results with regard to sex, haematuria and flank pain

|                   | <b>UFR<br/>n (%)<br/>111(95.68)</b> | <b>X-ray KUB<br/>n (%)<br/>61(52.58)</b> | <b>USS<br/>n (%)<br/>58(50.00)</b> |
|-------------------|-------------------------------------|--|------------------------------------|
| <b>Sex</b>        |                                     |  |                                    |
| Female(n=44)      | 18(45.00)                           | 13(21.31)                                | 8(57.14)                           |
| Male(n=72)        | 38(53.52)                           | 32(52.45)                                | 29(65.90)                          |
| P Value           | 0.389                               | 0.191                                    | 0.820                              |
| <b>Haematuria</b> |                                     |  |                                    |
| No( n=91)         | 41(45.05)                           | 31(70.45)                                | 27(69.23)                          |
| Yes(n=25)         | 15(60.00)                           | 14(82.35)                                | 10(52.63)                          |
| P value           | 0.278                               | 0.344                                    | 0.434                              |
| <b>Flank Pain</b> |                                     |  |                                    |
| No (n=11)         | 5(45.45)                            | 2(100)                                   | 0                                  |
| Yes (n=100)       | 51(51.00)                           | 43(72.08)                                | 37(64.91)                          |
| P value           | 0.727                               | 0.391                                    | 0.323                              |

Table 3: Time of presentation to the OPD

| <b>Time of presentation (min)</b> | <b>n</b> | <b>%</b> |
|-----------------------------------|----------|----------|
| 0-30                              | 5        | 4.3      |
| 31-60                             | 60       | 51.7     |
| 61-120                            | 51       | 44.0     |
| 121-240                           | 0        | 0        |

## Discussion

This study evaluates clinical and demographic patterns, and associated risk factors among patients with urolithiasis assessed in a rural hospital in Sri Lanka. The mean age of the study sample with urolithiasis was 46.61 years (SD=13.22), in contrast to a younger mean age of 31 years in a study done in Turkey<sup>7</sup>. Studies indicate that the typical age of presentation ranges from 20-60 years, which includes the mean age of presentation of this study population<sup>4</sup>. Previous work suggests that the first episode of renal colic occurs at a

younger age (20-40 years) compared to the mean age of this sample<sup>17</sup>. Out of the population, 36.2% had a past history of ureteric colic. There is also a possibility that a proportion of those who did not reveal a past history of ureteric colic may have had asymptomatic underlying renal stone disease, or may have been undiagnosed previously. It is a known fact that renal stones have a tendency to recur. In the absence of medical treatment, the risk of stone recurrence in an individual patient has been shown to be 40% within 3 years, 75% within 10 years, and 98% within 25 years<sup>5</sup>. Similarly, another study

reported that 50% will have a recurrence within 5-10 years, and 75% within 20 years<sup>1</sup>. Metabolic abnormalities have been identified to be responsible for stone recurrence in 97% of patients, and the remission rate of medical prophylaxis in calcium stone formers is almost 80%<sup>13,18</sup>. Preventive medical management in stone formers is important to prevent further episodes, as studies have shown that a stone former can develop up to seven episodes in a lifetime<sup>5</sup>.

This study showed a male predominance of 62.1% with regards to urolithiasis, similar to *Serinken et al.*,<sup>7</sup> who have reported a male predominance of 75.7%. The mean age of presentation in males was slightly higher than that of females, similar to the pattern showed by *Serinken et al.*<sup>7</sup>

There has been a rapid increase in the prevalence of urolithiasis, especially in developed countries over the past few decades, and this increase has been seen more significantly in females, in whom the incidence is now almost equal to that of males<sup>19</sup>.

Further studies are needed to evaluate the possible risk factors for urolithiasis in this community, including closer inspection of their drinking habits, water sources and metabolic profiles.

## Conclusions

Further studies among larger populations will be useful in further characterization of clinical and epidemiological data regarding urolithiasis in the population. Analysis of drinking water and study on dietary and other lifestyle factors of the region would be useful in further evaluation of the problem.

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## Availability of data and material

The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

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## Competing interests

The authors declare that they have no competing interests.

## Authors' contributions

UR conceived the research idea and guided it. Data collection was done by UR, DB, TJ and TA. Analysis and interpretation of data and literature review were done by UR, KPJ, and ME. UR guided the other authors in data analysis, interpretation and corrected the final manuscript. All authors were involved in the study and read and approved the final manuscript.

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