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A Prospective Study on the Prevalence of Ureteric Colic and Treatment for the Pain Management



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ABSTRACT

Renal calculi can be defined as a condition in which there is a formation of stone in any anatomical region of the kidney due to the supersaturation of urine characterized by severe pain usually sudden in onset, very severe and colicky (intermittent) and radiating from the back, down the flank and into the groin. Among the total population of 103 patients, 53 patients had stone in the ureter (51.45%), 14 patients had stone in the bladder (13.5%) and 36 patients had stone in the pelvic region (34.9%). Among 103 patients who were involved in the study, 53.39% (n=55) showed the symptom of hematuria and 46.6% (n=48) were not having hematuria.



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INTRODUCTION

Renal calculi can be defined as a condition in which there is a formation of stone in any anatomical region of the kidney due the supersaturation of urine characterized by severe pain usually sudden in onset, very severe and colicky (intermittent) and radiating from the back, down the flank and into the groin. This pain is known as Ureteric Colic.¹ Renal stones are common in both sexes and estimated as 5% of American women and 12% of men at any point in their life with male-female ratio of 2:1. The main etiological reason for having stone formation is that the insoluble substances causes formation of crystals which grows and aggregate due to the supersaturation of urine.² Reason for stone formation are Dehydration, Hyperparathyroidism, Hypocalcaemia, Hypercalciuria, Hyperoxaluria, Hyperuricaemia, Hyperuricosuria, Infection, Cystinuria, Renal Tubular Acidosis, and Polycystic Kidneys. Medullary Sponge Kidneys. Apart from these, deficiency of Vitamin A, decreased urinary citrate, inadequate urinary drainage and urinary stasis, prolonged immobilization are responsible for stone formation.³ Acute renal stone may lead to flank pain occur during traveling of stone through urinary track. The pain chaperone by hematuria, nausea or vomiting and malaise; fever and chill may also be coexisting with renal calculi. However, stones in the renal pelvis may be asymptomatic.⁴ Urine culture are crucial if the patient is febrile or leukocytes are detected in the urine.⁴ Ultrasonography (US) and Intra Venous Urography (IVU) are most frequently used diagnostic medical imaging method. This is safe, rapid, inexpensive and repeatable method for diagnosis of urinary stone location.⁵ The physician should carefully analyze the renal function before administration of NSAIDs. Diclofenac is the common NSAIDs used in patients with acute ureteric colic.⁶ The other combinations include Ketorolac with Morphine, Diclofenac Sodium with IV papaverine, Hyoscine with dipyrone, IV Opioids plus NSAIDs or Acetaminophen.⁷

AIM

- To determine the prevalence of Ureteric Colic due to Renal Calculi.
- To analyse the etiological aspects of Ureteric Colic.
- To identify the locations of Renal Calculi among the study population.
- To analyse the treatment given for pain management in acute ureteric colic.

METHODOLOGY

The study was designed as a prospective observational study which carried out in the KARUNA MEDICAL COLLEGE HOSPITAL, Vilayodi, Chittur- Palakkad. The study was carried out in Inpatient, Outpatient Department of General Medicine, Surgery, Urology and Casualty Department and a total of 103 cases with Acute Ureteric Colic due to Renal Calculi were enrolled in the study. The study has been carried out for a period of six months from November 2018 – April 2019. The study protocol was approved by Institutional Ethics Committee IHEC/14/2018 of Karana Medical College Hospital.

During the study period, patients attending the Medicine, Surgery, Urology ward and Casualty with pain associated due to any type of Renal Calculi were included for the study.

Written informed consent was obtained from the patients. Specially designed data entry form was used to collect data related to the patient's demographics, medical history, medication history, laboratory values and current treatment of Ureteric Colic.

By means of the same data collection form patients social habits, symptoms of hematuria, size and location of the stone were also recorded.

RESULTS AND DISCUSSION

Table No.1: Age wise distribution among Renal Calculi patients

AGE (YEARS)	NUMBER OF PATIENTS (n=103)	PERCENTAGE (%)
18-29	9	8.73
30-39	35	33.9
40-49	33	32.03
50-59	18	17.14
60-70	8	7.76
MEAN \pm SD		43 \pm 10.44

The majority of patients belong to the age group 30-39 years, which include thirty five patients, comprising about 33.9%, followed by 40-49 years (32.3%) and least 7.76% (60-70 years). This corresponds to the data obtained from a double blind randomized control trial, done by **Payandemehr P et al., (2014)⁸** where the mean age group of patients were 35 years. Concentration of patients in this age group may be due to proneness to have other co-morbid conditions and also due to increased exposure to risk factors such as hot climate due to their occupation, concentrating their urine followed by formation of stones.

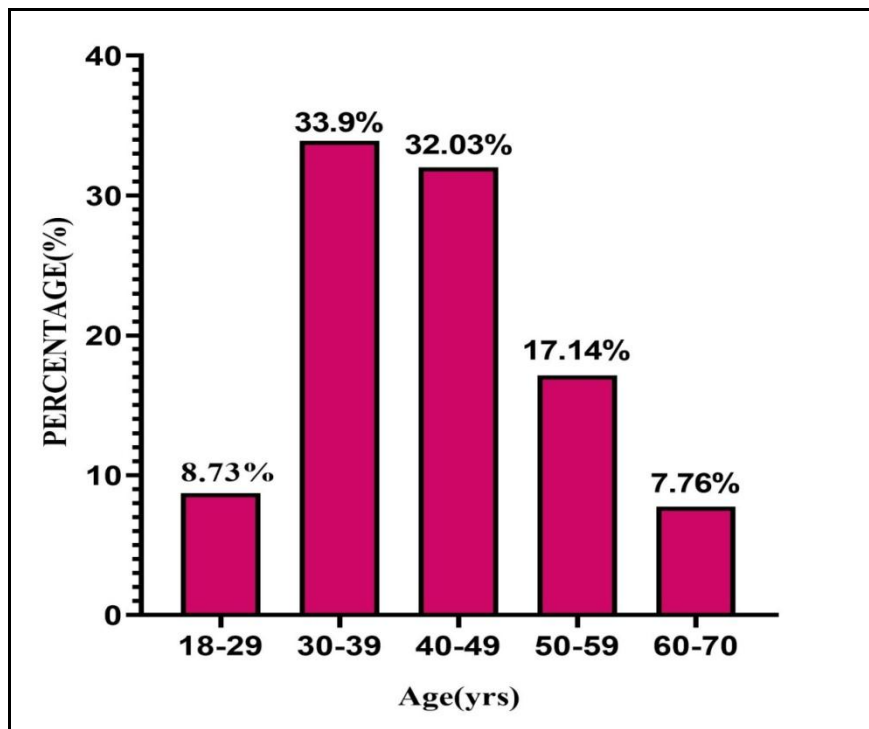


Figure No. 1: Age wise distribution among Renal Calculi patients.

Table No.2: Gender wise distribution among Renal Calculi Patients.

GENDER	NUMBER OF PATIENTS (n=103)	PERCENTAGE (%)
Male	69	66.99
Female	34	33

Among the total study population sixty nine (66.99%) were male patients and thirty four were female patients (33%). An equivalent study conducted by **Moe O W et al., (2006)⁹** states that renal calculi is more common in men than in women throughout most of adult life, which correlates with our study.

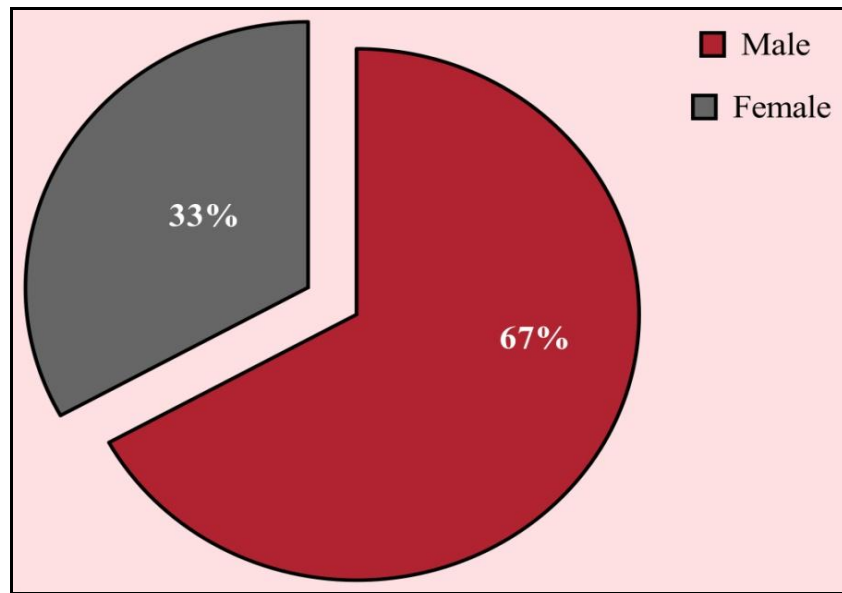


Figure No. 2: Gender wise distribution among Renal Calculi Patients

Table No. 3: Dietary habit of patient with renal calculi

DIETARY HABITS	NUMBER OF PATIENTS (n=103)	PERCENTAGE (%)
SALT RESTRICTED	8	7.76
SUGAR RESTRICTED	10	9.70
NORMAL DIET	85	82.52

Analyzing the dietary habits of the patients with ureteric colic, out of 103 patients 82.5% were taking mixed diet including high protein food, urate containing food, spicy foods and high salt and sugar containing foods. These populations were highly prone to have stone formation. On other hand, sugar restricted (9.7%) and salt restricted (7.8%) the formation of stone was found to be reduced. This indicates that consumption excess of sugar and salt may be a risk factor for renal stone.

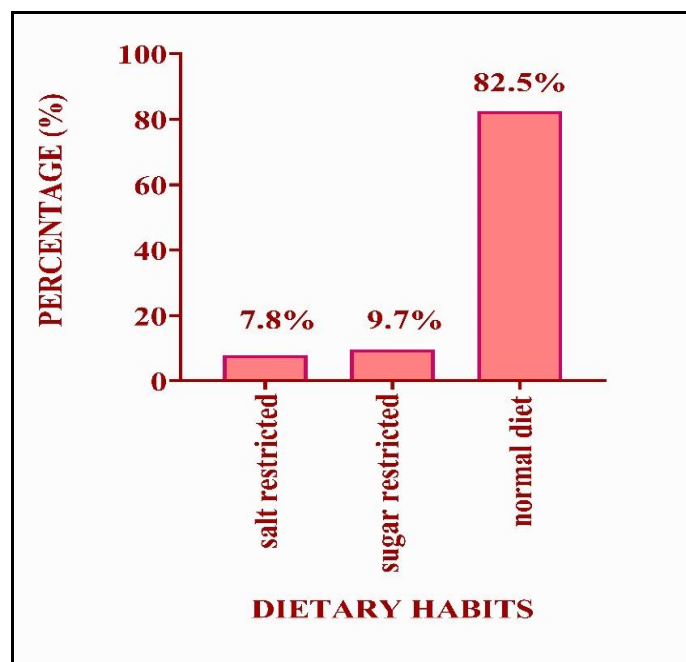


Figure No. 3: Dietary habit of patient with renal calculi

Table No. 4: Risk Factors (alcohol) associated with renal calculi patients

ALCOHOLIC	NUMBER OF PATIENTS (n=103)	PERCENTAGE (%)
YES	14	13.59
NO	89	86.40

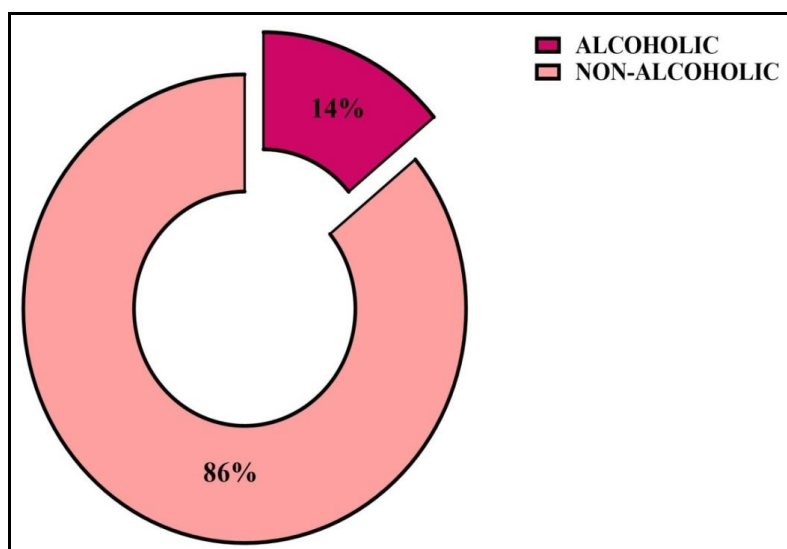


Figure No. 4: Risk Factors (alcohol) associated with renal calculi patients

Among 103 patients 14 patients were found to be alcoholic in this study. An equivalent study conducted by **Michael J et al., (2006)**¹⁰ state that, this is one of the leading cause of renal calculi disease. The consumption of alcohol has previously been linked to regional variation in the occurrence of kidney stone.

Table No. 5: Risk Factors (smoking) associated with renal calculi patients

SMOKERS	NUMBER OF PATIENTS (103)	PERCENTAGE (%)
YES	56	54.3%
NO	47	45.7%

Among 103 patients 56 patients were smokers and 47 were found to be nonsmokers. Smoking has been found to be the leading causes of acute renal calculi. Smoking increase the cadmium level in the body and finally leads to severe renal calculi condition which is being stated by **Japurep L et al.,(1993)**¹¹.

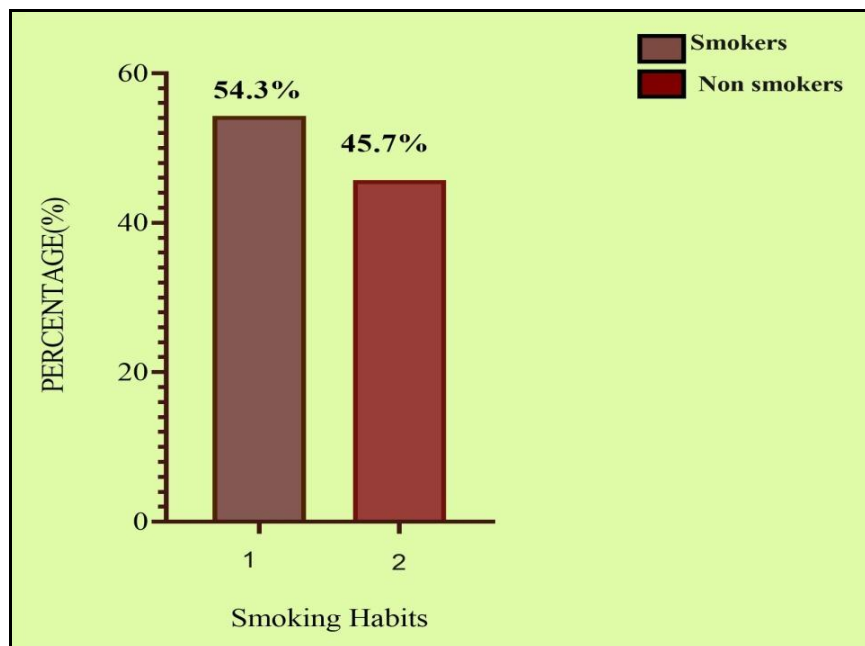


Figure No. 5: Risk Factors (smoking) associated with renal calculi patients

Table No. 6: Daily Fluid intake in Renal Calculi patients.

FLUID INTAKE (L)	NUMBER OF PATIENTS (n=103)	PERCENTAGE (%)
<2 L	48	46.6
2-4 L	47	45.63
>4 L	8	7.76

When the daily fluid intake of patients with renal calculi were recorded, it was found that among 103 patients, 46.6% of patients were drinking water approximately less than 2 liters followed by 45.63% of patients taking 2-4 L and 7.76% of patients taking >4 L being the least observed category which indicates that when the consumption of water decreases the chance of having renal stone increases.

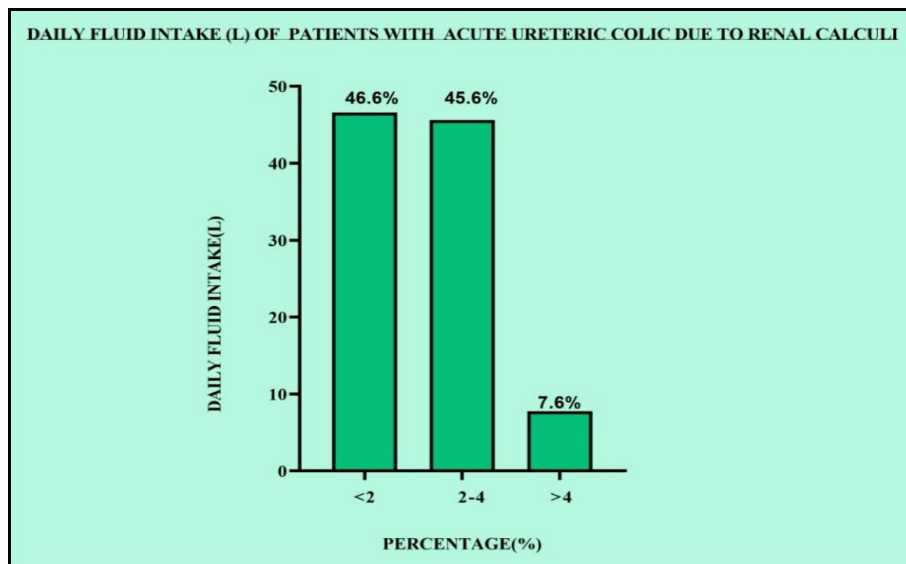


Figure No. 6: Daily Fluid intake in Renal Calculi patients.

Table No. 7: Hematuria found in patient with Renal Calculi

HEMATURIA	NUMBER OF PATIENTS (n=103)	PERCENTAGE (%)
PRESENT	55	53.39
ABSENT	48	46.6

Among 103 patients who were involved in the study, 53.39% (n=55) showed the symptom of hematuria and 46.6% (n=48) were not having hematuria. Hematuria is considered as a classical symptom of renal calculi. In our study, we found that 72.81% of the population had

a stone with a size more than 4mm and 53.39% patients had hematuria, which indicates that chance of having hematuria is proportional with that of increase in size of stone.

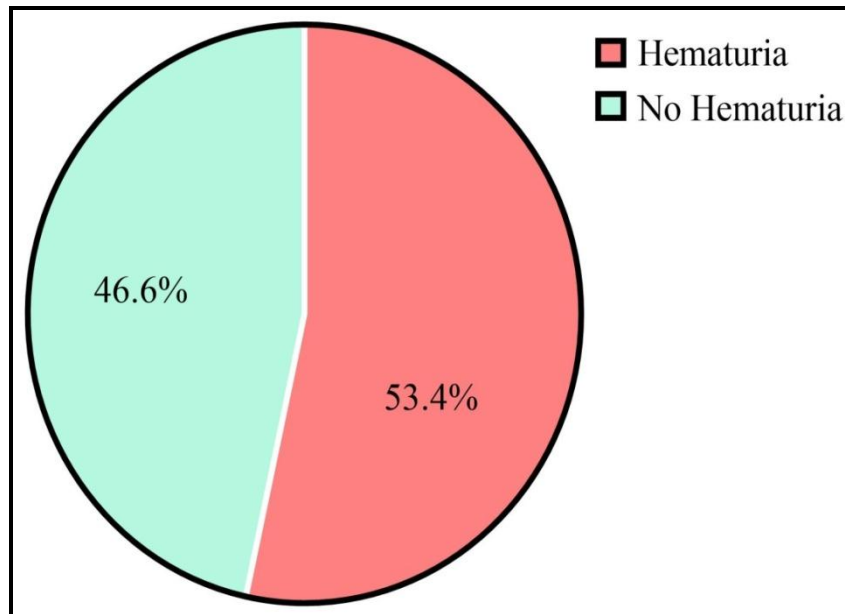


Figure No. 7: Hematuria found in patient with Renal Calculi

Table No. 8: Co-Morbidity status along with Renal Calculi

DISEASE CONDITION	NUMBER OF PATIENTS (n=103)	PERCENTAGE (%)
HYPERTENSION	11	10.67
DIABETES MELLITUS	15	14.56
HYPERTENTION + DIABETES MELLITUS	10	9.7
HYPOTHYROIDISM	5	4.8
HYPERLIPIDEMIA	5	4.8
UTI	6	5.8
HERNIA	2	1.94
OTHERS	5	4.8
PATIENTS WITHOUT CO- MORBID CONDITIONS	44	42.7

There is increasing evidence that renal calculi disease frequently develop with DM and HTN in response to the common risk factors (smoking, alcohol, dehydration). This may also

contribute significantly to its clinical manifestations and severity. The comorbidity status among renal calculi patient display Diabetes Mellitus (14.56%) as the most frequent disease followed by Hypertension (10.67%). An equivalent study conducted by **Moe O W et al.,(2006)⁹** concluded that DM (14.56%) is the most common comorbidity in renal calculi leading to the formation of renal colic thus this study correlates with our study.

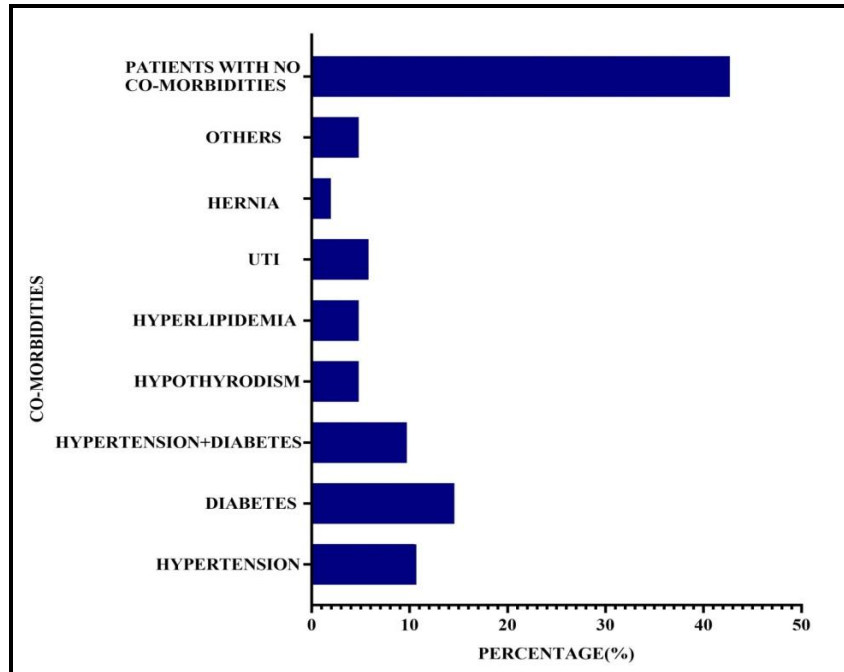


Figure No. 8: Co-Morbidity status along with Renal Calculi

Table No. 9: Size of the stone in the renal calculi patients

STONE SIZE (mm)	NUMBER OF PATIENTS (n=103)	PERCENTAGE (%)
0 – 4	28	27.18
>4	75	72.81

Among the 103 patients, 28 patients had a stone size between 0-4mm (27.1%), in 75 patients the stone size was above 4mm (72.8%). The study conducted by **Frassetto L et al.,(2011)⁴** shows that the stone size less than 4mm in diameter as measured using computed tomography or ultrasonography are eliminated through urine but the stone size more than 4mm were not excreted through urine and exhibiting severe pain and hematuria.

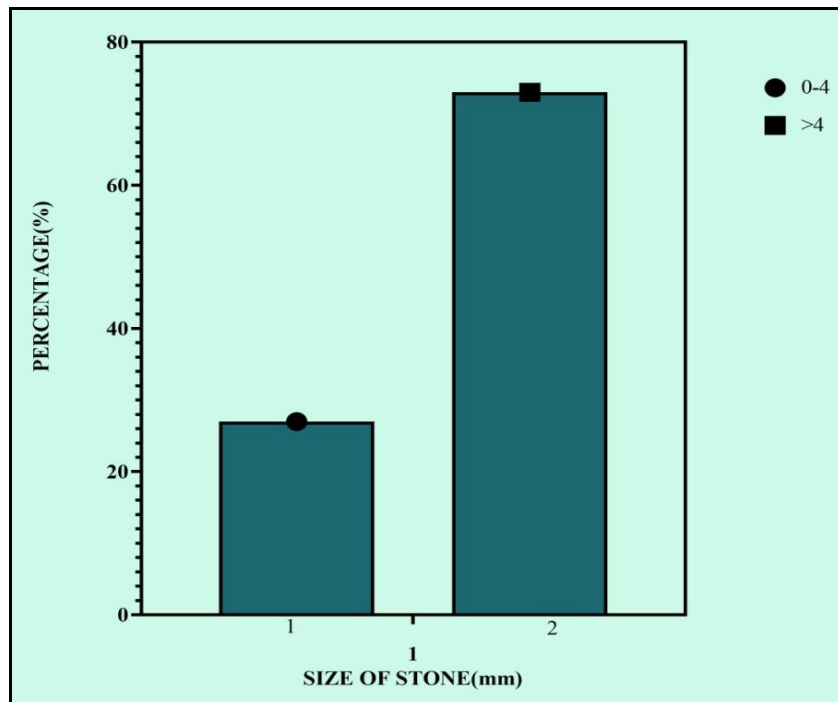


Figure No. 9: Size of the stone in the renal calculi patients

Table No. 10: Location of stone in Renal Calculi patients

LOCATION	NUMBER OF PATIENTS (n=103)	PERCENTAGE (%)
URETER	53	51.45
BLADDER	14	13.59
PELVIC	36	34.94

Among the total population of 103 patients 53 patients had stone in the ureter (51.45%), 14 patients had stone in the bladder (13.5%) and 36 patients had stone in the pelvic region (34.9%). Ureter stone are most common in this study, in the case of ureter stone the average size stone will stuck in the ureter and show the symptom of severe pain. **J.Jackson et al.,¹²**in his study they conclude that stone location made a significant difference in the prescription of MET. The stone locations were found to be 27%, proximal ureter 16%, distal ureter 35% and unknown 22%. From this study, it is indicative that stone location are predominant in the ureter region than any other region.

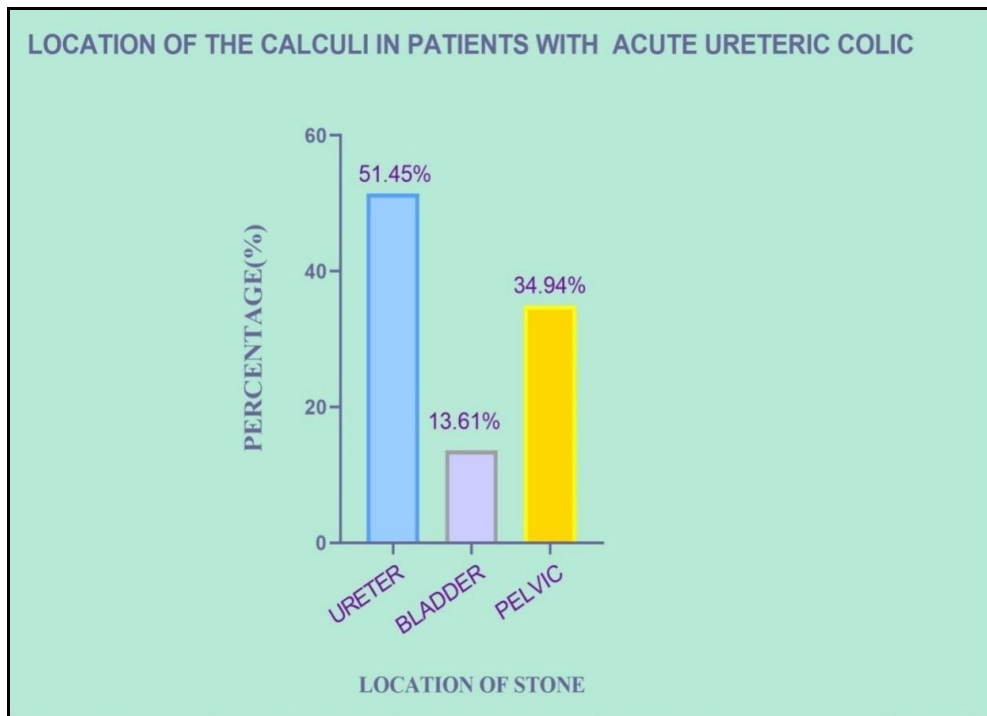


Figure No. 10: Location of stone in Renal Calculi patients.

Table No.11: Type of stone in renal calculi patients

TYPES	NUMBER OF PATIENTS (n =103)	PERCENTAGE (%)
CALCIUM PHOSPHATE	51	49.51
CALCIUM OXALATE	30	29.12
CYSTEINE	22	21.35

Among the 103 patients who were enrolled in study 51 had calcium phosphate stones (49.51%), followed by 30 patients with calcium oxalate stones (29.12%) and 22 had cysteine stones (21.35%). This result indicates that in the region of Palakkad depending on their lifestyle, occupation and dietary habits they are more prevalent to have calcium phosphate stones. This result is conclusive with the data obtained from study conducted by **Frassetto L et al.,(2001)⁴**. Their study reveals that 56 - 61% of samples had calcium phosphate stone, followed by Calcium oxalate being 8-18% and cysteine 1% among the world population which is being stated in American Family Physician.

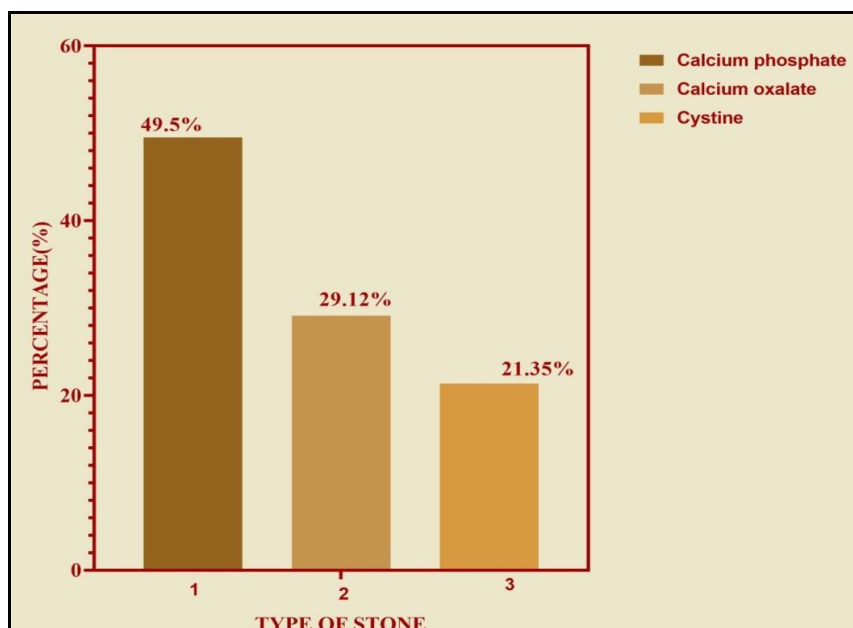


Figure No. 11: Type of stone in Renal Calculi patients

Table No. 12: Serum creatinine level in Renal Calculi patients

SERUM CREATININE (mg/dl)	NUMBER OF PATIENTS (n=103)	PERCENTAGE (%)
0.6 – 1.2	75	72.81
> 1.2	28	27.18

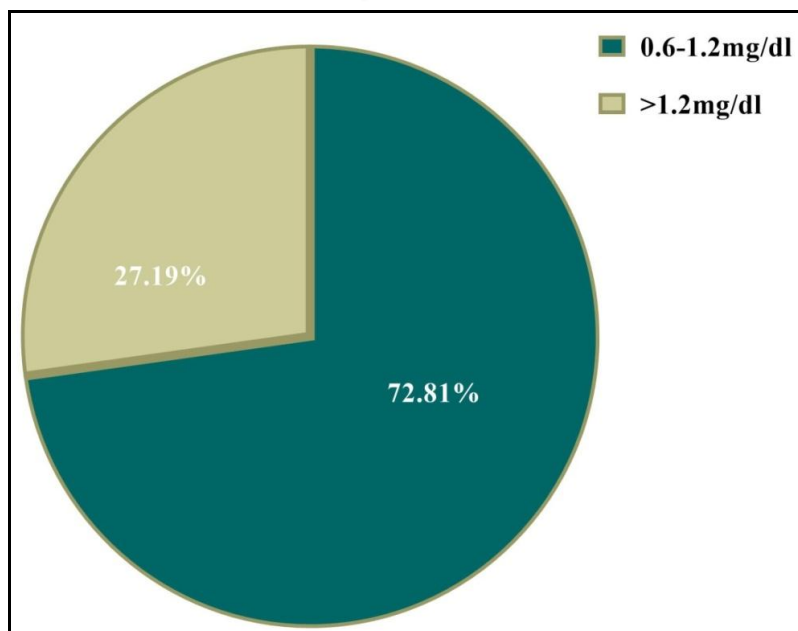


Figure No. 12: Serum creatinine level in Renal Calculi patients

The normal range of serum creatinine is 0.6-1.2 mg/dL, only 27.18% (n=28) of the total population had an increased creatinine value that is more than 1.2 mg/dL, the rest of the population that is 72.81% (n=75) had a normal creatinine level in between 0.6-1.2 mg/dL. This result indicates that the renal calculi does not have any association with that of creatinine level in the body or imbalance with that of the glomerular filtration rate.

Table No. 13: Antibiotic prescribed among Renal Calculi patients

CLASSIFICATION OF DRUG	DRUG PRESCRIBED	NUMBER OF PATIENTS (n=103)	PERCENTAGE (%)
CEPHALOSPORINS	CEFTRIAZONE	21	20.38
	CEFUROXIME	9	8.73
AMINOGLYCOSIDES	AMIKACIN	26	25.24
FLUROQUINOLONES	CIPROFLOXACIN	6	5.82
ANTIBIOTICS NOT PRESCRIBED		41	39.80

During the study, it was found that most of the patients having renal calculi (n=41) were not prescribed with any kind of Antibiotics. It prescribes, the most commonly used Antibiotics were Cephalosporin, Aminoglycosides and Fluoroquinolones.

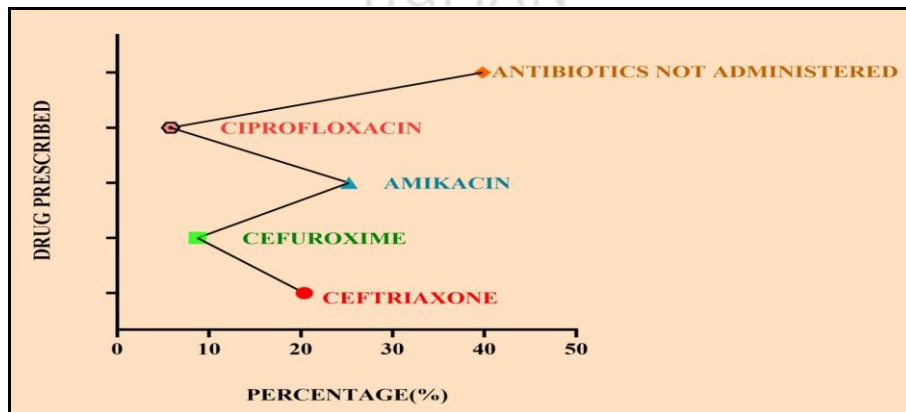


Figure No. 13: Antibiotic prescribed among Renal Calculi patients

Table No. 14: Drug of choice during the therapy renal calculi patients

DRUG	NUMBER OF PATIENTS (n=103)	PERCENTAGE (%)
DICLOFENAC SODIUM	61	59.22
TRAMADOL	42	40.77

Among the total population of 103 patients, 61 patients were administered IV Diclofenac Sodium (59.22%) and 42 patient were given IV Tramadol (40.77%). An equivalent study conducted by **Salameh S et al., (2011)⁶** state that diclofenac proved to be superior to tramadol for pain relief in patient with renal colic due to renal calculi. Tramadol could be used as alternative when contraindication preclude the use of Diclofenac.

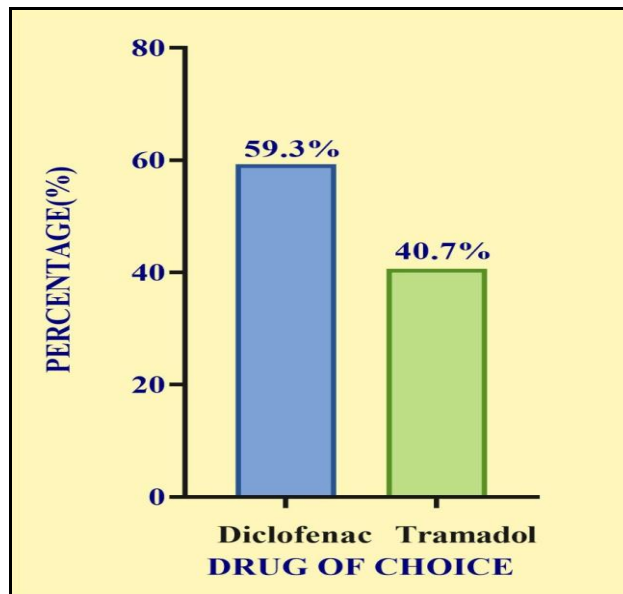


Figure No. 14: Drug of choice during the therapy renal calculi patients

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