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A Clinical Study of Risk Factors for Urinary Calculi

Rajesh Kale [1], D Anil [2*]

1. Associate Professor, Department of General Surgery, Prathima Institute of Medical Sciences, Naganoor, Karimnagar.
2. Assistant Professor, Department of General Surgery, Prathima Institute of Medical Sciences, Naganoor, Karimnagar.

Abstract

***Background**: Pain abdomen due to urinary calculi is a very common presentation in surgical clinics. Accurate diagnosis and treatment are crucial for adequate management of the cases. We in this study tried to determine the risk factors for urinary calculi and implement them in the population, to prevent their occurrence. **Methods:** This study was conducted in the Department of General Surgery/Urology, Prathima Institute of Medical Sciences, Naganoor, Karimnagar. A total of n=100 patients with urinary tract calculi were included in the study. Various risk factors were assessed and studied. Clinical manifestations of these patients were studied. **Results:** A total of n=100 patients were studied during the period. Out of n=100 cases, 54% were males and n=45% were females. The mean age of presentation was 25.5 years in males and 28.0 years in females. The commonest age group involved in males was 21 – 30 years with 30% cases and the common age group of involvement in females was 31 – 40 years 25 % of total cases. The anatomical location of calculi revealed n=81% renal stones and 16% ureteric calculi and both were involved in 3% of cases. **Conclusion**: Various risk factors have been identified in our study like consumption of non-vegetarian diet, consumption of tomato, alcohol consumption, urinary tract infection, severe physical exercise. Educating patients regarding the above risk factor can reduce the incidence of urinary calculi and decrease morbidity in the general population.*

***Keywords**: Urinary Calculi, Risk Factors, Management, Clinical Study*

Address for correspondence: Dr. D Anil. H.No.19-3-158/6, Sainath Reddy Hospital, Markandeya Colony, Godavarikhani 505209, Telangana, Email: anilchikkumicky@gmail.com

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Introduction

Urinary tract calculi are extremely common problems afflicting mankind for ages. Although difficult to estimate accurately the incidence of upper urinary tract calculi in different populations, the risk of forming upper urinary tract calculus is increasing and it is estimated that such stones affect 5 to 15% of the population in the West. [1] Until the 1980's urinary calculi were a major health problem, with a significant proportion of patients requiring extensive surgical procedures and a sizable minority losing their kidneys. The advent of extracorporeal techniques for stone destruction and refinements in endoscopic surgery and laparoscopy however has greatly decreased the morbidity of management of urolithiasis and reduced the length of hospitalization. [2] Although very few individuals die because of stone disease, it does lead to substantial morbidity from pain, urinary tract infection, and obstructive uropathy. Various factors such as dietary habits, occupation, urinary infection, prolonged immobilization are responsible for the formation of stones. Surgery forms the cornerstone for the management of urinary stones in the form of endourological procedures and open procedures. While there have been rapid advances in technology related to surgical aspects of stone treatment, these have outstripped our ability to prevent formation and recurrence. In the present study, an attempt was made to study the modes of presentation of upper urinary tract calculi and

to study the various modes of management of these calculi.

Materials and Methods

This cross-sectional study was done in the Departments of General Surgery/Urology, Prathima Institute of Medical Sciences, Naganoor, Karimnagar. Institutional Ethical committee permission was granted for the study as per the human research protocol. Written consent was obtained from all the participants of the study.

Inclusion criteria

1. All patients diagnosed to have urinary tract calculi.
2. Aged above 15 years.
3. Males and females

Exclusion criteria

1. Patients with the stone disease with renal failure requiring dialysis.
2. Children below the age group of 12 years.
3. Further, patients who did not consent for the information or those who could not be followed up till the end of the study were excluded from the study.

All the patients reported during the study period with signs and symptoms of urolithiasis were subjected to a detailed history, including personal history, history of similar symptoms before, treatments taken medical history, and surgical history. A complete clinical examination was done. Patients were sent for investigations of ultrasonography and if required underwent KUB and they were managed with ESWL extracorporeal shock wave lithotripsy or percutaneous nephrolithotomy and those not amenable for treatment with endoscopy or laser were subjected to laparoscopic or key-hole surgeries.

Results

A total of n=100 patients were studied during the period. Out of n=100 cases, 54% were males and n=45% were females. The mean age of presentation was 25.5 years in males and 28.0 years in females. The commonest age group involved in males was 21 – 30 years with 30% cases and the common age group of involvement in females was 31 – 40 years 25 % of total cases. The anatomical location of calculi revealed n=81% renal stones and 16% ureteric calculi and both were involved in 3% of cases depicted in table 1.

Table 1: Anatomical location of calculi

Location	*Male*	*Female*	*Total (%)*
Kidney	41	40	81(81%)
Ureter	11	05	16(16%)
Both	02	01	03(3%)
Total	54	46	100

A socio-economic evaluation of cases involved revealed 70% of cases were from middle economic status 28% were from low socioeconomic status and 2% belonged to high socio-economic status. The literacy rates revealed 52% of the cases were illiterates most of whom were residing in rural areas. Out of 48% of literates, 24% were primary school dropouts and 19% completed up to secondary school and 14% had passed 10th standard.

Table 2: Urban/Rural Status associated with Urinary Calculi

Status	*Male*	*Female*	*Total (%)*
Urban	25	22	47(47%)
Rural	29	24	53(53%)
Total	54	46	100

Dietary evaluation of the cases revealed urinary calculi occurred more frequently in non-vegetarian people. Out of n=100 cases in the study, n=97% were non-vegetarian and 3% were pure vegetarian (table 3). A detailed history of dietary habits revealed tomato consumption was found in 83% and spinach consumption was found in 21% of cases milk and its products were consumed by 13% of people. Hard water was consumed by 38% of people 44% revealed alcohol consumption and excess salt intake in the diet was found in 35%

Table 3: Urinary calculi according to the type of diet

Dietary habits	Male	Female	Total (%)
Vegetarian	02	01	03(3%)
Non-vegetarian	52	45	97(97%)
Total	54	46	100

Urinary tract infection was commonly found in the cases with urinary calculi 51% and 28% were with a family history of kidney stones. Dehydration and consumption of antacids were found in 18% and 10% each obesity was found in 13% given in table 4.

Table 4: Urinary Calculi Associated with other factors/diseases

	Male	*Female*	*Total*
UTI	22	29	51
Catheterization	02	07	09
Dehydration	08	10	18
Antacids	04	06	10
Obesity	03	10	13
Family H/O	15	13	28

Discussion

Urinary stone has been affecting mankind for thousands of years. However, since the industrialization development of urban living conditions and change in food habits the incidence of urinary calculi in the population is increased up to 10 -12%. In countries like India where water resources are scarce because of large drylands where people commonly depend on the underground water resources for drinking water face kidney stone formation 5 – 10% in a life-time. [3] In this study, the incidence of urinary calculi was twice more common in males as compared to females. Similar trends have been shown in other studies in this field. [4, 5] One of the probable reasons could be the effects of sex hormones on some lithogenic risk factors and the concentration of lithogenic factors in urine usually greater in men than women. [6 - 9] In this study a study of comorbidities revealed 23% of cases were with hypertension. Other studies have proposed hypertension as an independent risk factor for urolithiasis. [10-12] It has also been proposed that patients with hypertension excrete a far greater amount of calcium as compared to normal people. [13] In this study, 5% of cases in this study were with a history of Diabetes Mellitus. Studies have shown a higher prevalence of urolithiasis in diabetics due to insulin resistance and lower pH in urine and impaired kidney ammonia genesis all promoting stone formation. [14 - 17] In the present study, urinary lithiasis incidence was far greater in Illiterate people could be due to exposure to high temperatures exhibited lower urine volumes and pH, higher uric acid levels, and higher urine specific gravity, leading to higher urinary saturation of uric acid. urolithiasis is more commonly seen in patients who consume more dietary tomatoes, similar to the observation of other studies. [18] Some calcium oxalate stone formers may have higher urinary oxalates, not because they eat more high oxalate foods, but because they absorb more of the dietary oxalate they consume. [19] Although gastrointestinal disease increases oxalate absorption most hyperoxaluric stone formers don't have conditions predisposing to oxalate over absorption. Although the early investigations found no difference in the mean percentage of oxalate absorbed, other more recent studies have reported higher rates in at least hypercalciuric. [20] In all studies, investigators fed food containing labeled oxalate, then collected urine for 24 hours. Most non-stone formers absorb between 3-10% of an oxalate load, so absorption over 10% was high. Overall, the studies support the concept that at least one-third of the stone-forming population absorb more than 10% of dietary oxalate. For these individuals, dietary counseling to reduce oxalate consumption should be especially beneficial. Urinary calculi formation is more common in patients who had Urinary tract Infections in the past as also reported by A Saxena et al; [21] Hard water consumption is seen in more association with urinary tract calculi formation but no such statistical significance was found shown in other studies. [22, 23]

Conclusion

A better understanding of the relation between modifiable factors like diet and water intake and risk of urinary tract calculus formation should have the potential to provide simpler and more effective methods of prevention of urinary calculi. Various risk factors have been identified in our study like consumption of non-vegetarian diet, consumption of tomato, alcohol consumption, urinary tract infection, severe physical exercise. Educating patients regarding the above risk factor can reduce the incidence of urinary calculi and decrease morbidity in the general population.

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