

Research Article

**A Study on Urinary Tract Infection and metabolic diseases in Stone Patients
among local population of Pakistan**

**Muhammad Haroon Ghous¹, Ali Hassan²,
Sikander Afzal³ and Muhammad Arshad Cheema⁴**

¹Assistant Professor and Chair; Division of Urology, University College of Medicine, University of Lahore

²Senior Registrar, Department of Urology, University College of Medicine, University of Lahore

³Associate Dean (Admin), University College of Medicine, University of Lahore

⁴Chairman, Department of Surgery, University College of Medicine, University of Lahore

Corresponding Author: Dr. Muhammad Haroon Ghous, Assistant Professor and Head of Department of Urology, UCM, University of Lahore. **E.mail:** haroonghous99@gmail.com

[Received: 05/02/2019; Accepted: 08/04/2019; Published: 09/04/2019]

ABSTRACT

Introduction: Urolithiasis is a common disease throughout the world that affects the general population. It is estimated that approximately 2% of the population experience renal stone disease at sometimes in their life with peak incidence in 2nd and 3rd decades of life. **Aims and objectives:** The main objective of the study is to analyze the Urinary Tract Infection and metabolic diseases in Stone Patients among local population of Pakistan. **Material and methods:** This cross sectional study was conducted at University of Lahore Teaching Hospital, Lahore during July 2018 to December 2018. There were total 100 patients of both genders who were selected for this study. The data was collected through a random sampling method technique. The detailed history of all the patients were gathered and 24 hour urine sample was collected from each patient and sent for PH, specific gravity, Creatinine, uric acid, calcium, phosphate, oxalate, citrate and magnesium. Twenty-four hour urine samples were collected in plastic boxes, which do not react chemically by standard methods, and were stored at 2-8°C. In addition, blood sample of each patient was also sent for serum levels of urea, creatinine, uric acid, phosphate and calcium. **Results:** The data were collected from 100 patients with the mean age 38 ± 7.75 years. There were 35 male and 65 female patients who were enrolled in this study. The main presenting complaint was lumbar pain on the affected side i.e. in 79.0% patients, followed by hematuria and burning micturation. Majority of the patients i.e. 94.0%, were diagnosed as having renal stone or ureteric stone. Only 38.0% patients presented with recurrent stones while remaining 62.0% had stone for the first time. Chemical analysis of stones after definitive procedure had shown calcium oxalate stone in 82.5% patients. **Conclusion:** It is concluded that frequency of metabolic abnormalities is very high in patients with urolithiasis and hyperoxaluria, hypercalciuria and hypocitraturia are the most important metabolic abnormalities observed in these patients.

Key words: Urinary, Tract, Infection, Patients, Metabolic

INTRODUCTION

Urolithiasis is a common disease throughout the world that affects the general population. It is estimated that approximately 2% of the population

experience renal stone disease at sometimes in their life with peak incidence in 2nd and 3rd decades of life. There are several types of

urinary stones, and they are classified according to chemical composition¹. Calcium oxalate is the major component of the vast majority of stones. Several factors, such as age, gender, climate, metabolic abnormalities and heredity, are related to the development of urinary stones. Metabolic abnormalities are the most important factors because they can be modified to prevent the risk of urinary stones².

Indwelling urinary catheters are standard medical devices utilized in both hospital and nursing home settings to relieve urinary retention and urinary incontinence³. Of the almost 100 million catheters that are sold annually worldwide, one-quarter of them are sold in the United States⁴. The most common urinary catheter in use is the Foley indwelling urethral catheter, a closed sterile system that is comprised of a tube inserted through the urethra and held in place by an inflatable balloon to allow urinary drainage of the bladder⁵. Although these devices were originally designed for short-term use in patients, indwelling catheter use is now commonplace in the long-term setting⁶. The most notable complication associated with indwelling urinary catheters is the development of nosocomial urinary tract infections (UTIs), known as catheter-associated UTIs (CAUTIs). Infections of the urinary tract associated with catheter use are significant not only due their high incidence and subsequent economic cost but also because of the severe sequelae that can result⁷.

Theoretical background

A complicated urinary tract infection (UTI), which can involve either the bladder or kidneys, is a symptomatic urinary infection that occurs in individuals with functional or structural abnormalities of the genitourinary tract. Patients with complicated UTI should be treated by effective antimicrobial therapy as well as appropriate urological intervention to remove predisposing factors when the symptoms are associated, such as micturition pain, dysuria, urinary frequency, and low or high fever⁸. By contrast, asymptomatic bacteriuria (ASB) or

asymptomatic pyuria is identified by isolation of a specified quantifiable amount of bacteria in an appropriately collected urine specimen obtained from a patient without symptoms or signs referable to urinary infection⁹.

Aims and objectives

The main objective of the study is to analyze the Urinary Tract Infection and metabolic diseases in Stone Patients among local population of Pakistan.

MATERIAL AND METHODS

This cross sectional study was conducted University of Lahore Teaching Hospital, Lahore during July 2018 to December 2018. There were total 100 patients of both genders who were selected for this study. The data was collected through a random sampling method technique.

Inclusion criteria

- Patients with either multiple or recurrent urolithiasis diagnosed on ultrasonography and intravenous urography were included in this study.

Exclusion criteria

- Patients with any other disease were excluded from this study.
- Patients with chronic renal failure, chronic liver disease and with history of any chronic drug usage were excluded.

Data collection

The data were collected from 100 patients. The detailed history of all the patients were gathered and 24 hour urine sample was collected from each patient and sent for PH, specific gravity, Creatinine, uric acid, calcium, phosphate, oxalate, citrate and magnesium. Twenty-four hour urine samples were collected in plastic boxes, which do not react chemically by standard methods, and were stored at 2-8°C. In addition, blood sample of each patient was also sent for serum levels of urea, creatinine, uric acid, phosphate and calcium. The serum levels of metabolic parameters were measured by standard chemical procedures. All patients then had definitive procedure after completion of all workup and stones were sent to

pathology laboratory for chemical analysis to know about the stone composition.

Statistical analysis

The data were collected and analyzed through SPSS (Version 21.0). All the values were expressed in mean and standard deviation.

RESULTS

The data were collected from 100 patients with the mean age 38 ± 7.75 years. There were 35 male and 65 female patients who were enrolled in this

study. The main presenting complaint was lumber pain on the affected side i.e. in 79.0% patients, followed by hematuria and burning micturation. Majority of the patients i.e. 94.0%, were diagnosed as having renal stone or ureteric stone. Only 38.0% patients presented with recurrent stones while remaining 62.0% had stone for the first time. Chemical analysis of stones after definitive procedure had shown calcium oxalate stone in 82.5% patients (table 01).

Table 01: Descriptive statistics for different variables

Features	%age
Presenting Complaint:	
• Lumber pain	79.0
• Hematuria	13.0
• Burning micturation	8.0
Diagnosis:	
• Renal stone	63.0
• Ureteric stone	21.0
• Renal + Ureteric stone	10.06.0
• Urinary bladder stone	
Recurrent stone:	
• Yes	38.0
• No	62.0
Family history of Urolithiasis:	
• Yes	64.0
• No	36.0
Stone composition on Stone analysis:	
• Calcium oxalate	82.5
• Calcium phosphate	2.5
• Uric acid	11.5
• Struvite	1.5
• Cystine	2.0

Hyperoxaluria was the most commonly observed metabolic abnormality and was found in 129 (64.5%) patients. Other significant metabolic abnormalities were hypercalciuria, Hypercalcemia, hypocitraturia and hyperuricemia (table 02).

Table 02: Frequency of Metabolic diseases in selected participants

Metabolic abnormality	Frequency	%age
Hyperoxaluria (oxalate > 45 mg/d)	12	64.5
Hypercalciuria (> 250 mg/d for women and > 300 mg/d for men)	17	43.5
Hypocitraturia (citrate levels < 320 mg/d)	11	40.5
Hypernatruria (sodium level > 220 mmol/ day)	19	29.5
Hyperuricosuria (> 600 mg/d in women and > 750 mg/d in men)	3	21.5
Hypomagnesuria (magnesium level < 3 mg/day)	8	13.5
Hyperphosphaturia (phosphate level > 1.3 g/day)	13	11.5
Hypercalcemia (calcium above the normal range i.e. 8.4-10.2 mg/dl):	5	46.5
Hyperuricemia: (normal range 2.5-8 mg/dL for males and 1.5-6.0 mg/dL for females).	9	29.5

DISCUSSION

Urinary stones in its different forms are the third most common affliction of the urinary tract.⁹ Calculus disease is the commonest urological ailment in Pakistan. It has been apparent for several years that the incidence rates of lithiasis vary dramatically, not only from continent to continent but also between adjacent regions of a country, even if one allows for differences in methodology and criteria selection among epidemiology studies⁹. The lifetime prevalence of urinary stones has increased throughout the 20th century and occurs in up to 15% of the population. It is generally accepted that stones occur more commonly in males than females¹⁰. Our findings corroborate with this sex difference as reported by others. No age group is spared to urinary stone disease in Pakistan though a change in the age pattern of patients of urolithiasis has been reported in industrialized countries¹¹. In our study, the main presenting complaint was lumbar pain i.e. in 79.0% patients. Elfadil GA et al had also found flank pain as the chief presenting complaint in his study i.e. in 67% patients¹². The results of our study have shown a strong genetic predisposition to urinary stone disease as 64.0% patients had family history of urolithiasis. This genetic factor is also supported by studies of Kirac M et al and Majalan NN et al who had found a positive family history in 67.0% and 53.1% patient's respectively¹¹. On the other hand, Elfadil GA et al⁷ had found this in only 20% of their patients. We had also found 38.0% patients with recurrent urinary stones and the major stone component was calcium oxalate in our study which was also found by Elfadil GA et al.⁷ But in a study by Androulakakis et al, the main components of urinary stones in Europe, in decreasing order, are struvite, calcium phosphate and calcium oxalate¹³. In our study, metabolic abnormalities were found in 90.5% patients, whereas there was no metabolic abnormality in only 9.5% patients which is very much comparable to many previous studies. In a study by Amaro et al, 62.2% of patients had multiple metabolic abnormalities; however, the

patients did not have recurrent calcium oxalate stones¹⁴. Therefore, it can be presumed that multiple metabolic abnormalities are more common in patients with recurrent calcium oxalate stones. Kirac M et al in his study had found multiple metabolic abnormalities in 71.3% patients while in our study, 78.5% patients had multiple metabolic abnormalities and only 21.5% had one metabolic abnormality¹⁵.

Conclusion

It is concluded that frequency of metabolic abnormalities is very high in patients with urolithiasis and hyperoxaluria, hypercalciuria and hypocitraturia are the most important metabolic abnormalities observed in these patients. Stone disease is an increasing and major public health problem with high frequency of bladder stone.

Conflict of interest

There is no conflict of interest from authors.

REFERENCES

1. Basiri A, Shakhssalim N, Khoshdel AR, Ghahestani SM, Basiri H. The demographic profile of urolithiasis in Iran: a nationwide epidemiologic study. *IntUrolNephrol.* 2010;42:119–126.
2. Kirac M, Kupeli B, Karaoglan U, Bozkirli I. Metabolic evaluation in patients with recurrent calcium oxalate stones. *Turkish J Urol.* 2011;37(3):246–251.
3. Johri N, Cooper B, Robertson W, Choong S, Rickards D, Unwin R. An update and practical guide to renal stone management. *Nephron Clinic Practice.* 2010;116(3):159–171.
4. Parvin M, Shakhssalem N, Basiri A, Miladipour AH, Golestan B, Torbati PM, et al. The most important metabolic risk factors in recurrent urinary stone formers. *Urol J.* 2011;8(2):99–106.
5. Elfadil GA, Ibrahim ME, Ahmed SAM. Metabolic Constituents of Urinary Stone Composition in Sudanese Children. *Egypt Acad J biolog Sci.* 2010;2(2):21–25.

6. Amaro CR, Golberg J, Agostinho AD, Damasio P, Kawano PR, Fugita OE, et al. Metabolic investigation of patients with staghorn calculus: it is necessary? *Int Braz J Urol.* 2009;35:658–663.
7. Shekarriz B, Stoller ML. Metabolic evaluation of stone disease. *Brazil J Urol.* 2001;27(1):10–18.
8. Majalan NN, Baghianimoghadam B, Amiri N, Moosavi SM. Metabolic abnormalities in patients with recurrent stone formation in a hot territory. *Bratisl Lek Listy.* 2010;111(2):79–82.
9. Scales CD Jr, Curtis LH, Norris RD, Springhart WP, Sur RL, Schulman KA, et al. Changing gender prevalence of stone disease. *J Urol.* 2007;177:979–982
10. Androulakakis PA, Michael V, Polychronopoulou S, Aghioutantis C. Paediatric urolithiasis in Greece. *Br J Urol.* 1991;67(2):206–209.
11. Hess B, Hasler-Strub U, Ackermann D, Jaeger P. Metabolic evaluation of patients with recurrent idiopathic calcium nephrolithiasis. *Nephrol Dial Transplant.* 1997;12:1362–1368.
12. Coenye T., Nelis H. J. In vitro and in vivo model systems to study microbial biofilm formation. *Journal of Microbiological Methods.* 2010;83(2):89–105.
13. Ghanwate N. A., V Thakare P., Bhise P. R., Tayde S. Prevention of biofilm formation in urinary catheters by treatment with antibiofilm agents. *International Journal of Science and Research.* 2014;3(4):2–5.
14. Estores I. M., Olsen D., Gomez-Marin O. Silver hydrogel urinary catheters: evaluation of safety and efficacy in single patient with chronic spinal cord injury. *Journal of Rehabilitation Research and Development.* 2008;45(1):135–139.
15. Townsley L., Shank E. A. Natural-product antibiotics: cues for modulating bacterial biofilm formation. *Trends in Microbiology.* 2017;25(12):1016–1026.