

Frequency and prevention of Calcium Oxalate Renal Calculi in Adult Males from Bahawalpur, Pakistan

Zeeshan Yousuf¹, Haji Muhammad Rashid², Hafiz Ghulam Murtaza Saleem¹

¹ Department of Allied Health Sciences, University of Lahore

² University of Haripur

ABSTRACT

The purpose of the study was to produce awareness and assess the frequency of calcium oxalate stone in adult males from Bahawalpur. It is a cross-sectional study. The current study was conducted in urology ward, Bahawal Victoria Hospital, and then analyzed in a chemical pathology laboratory, Quaid-e-Azam Medical College, Bahawalpur, Pakistan. A sample of 320 patients was selected. The data were collected through a questionnaire. The questions were translated into local language by the interviewer for better comprehension, and the answers were reverse translated into English, and filled in the respective columns. The study showed that out of 320 patients, calcium oxalate stones were in 65% of patients. Uric acid, pure calcium oxalate, and calcium phosphate stones were in 24% patients, magnesium ammonium phosphate (struvite) stones were in 5% patients, pure calcium phosphate stones were 4% patients & cysteine acid stones were in 2% patients. In adult males of Bahawalpur, calcium oxalate calculi are abundant in adult males, i.e., 65%. In adult males of Bahawalpur, Pure Calcium oxalate stones are more common. It is due to hot climate; peoples are vegetarians. The water of Bahawalpur contains high levels of minerals. Most people are not using purified water. They have not cared about diet which causes renal stones.

Key Words

Frequency, Prevention, Calcium oxalate stones, Bahawalpur and Adult males

1 INTRODUCTION

Renal calculi are assemble when crystal inhibitors is interfere in the urine. However; morphology of the kidney also plays an critical role in the promotion of crystal precipitation (1). Kidney calculi formation happens when the urine is supersaturated with nutritive minerals like as calcium, oxalate, and phosphate. Crystals precipitate from solution and combined to form calculi. A 24-hour urine assortment that measures quantity, sodium, calcium, phosphorous, oxalate, uric acid, pH, and citrate find risk aspect for supersaturation and stone formation (2).

Production of calculi in the urinary tract depends on a broad field of underlying disorders. Clinician's glance for the underlying account for nephrolithiasis is vital to management. I gave a concise history and focal point mainly about the pathophysiology of renal calculi. Despite valuable approaches have been formed in understanding nephrolithiasis from specific gene fault, the perceptive of racial accounts of kidney stones is closed large mysterious. A kidney stone is three times more expected in men than women except in the sixth decade of life(3). A valuable fraction of details that resulted in new methods of therapy and prophylaxis, which can be applicative or final and conclusive, has focused on the urinary notable chemical makeup of the precipitous solutes. Inhibitors and epithelial factors usage are need and important for further examination. Prior to the therapy of nephrolithiasis rely upon to combine the work of scientists and clinicians to be aware the pathophysiology. The proportion of a unilateral ureterovesicular juncture obstruction due to calculi disease is alligation at 20% in literature; however, bilateral ureteral calculus are not famaliar, although acute kidney collapse following bilateral obstructing kedney calculi has been reported (Stone et al., 2010). In obese patients, it has been reported that bariatric surgery leads to advanced kidney collapse as a effect of secondary hyperoxaluria. Therefore, such surgery is pursued by oxalate nephropathy and nephrolithiasis(3).

Most men usually suffer their first occurrence about 30-40 year, age and first presentation in a woman are somewhat later. The disease of urinary tract stone is as old as man(4). Egyptian mummies found by the researcher about 7,000 years old(5). Since World War II, the presence of stone disease has been increasing very high and surprising in the Western industrialized nations. Every year about 3 million peoples in the world visit hospital

emergency rooms for urolithiasis(4). Studies of epidemiology reveal many aspects like sex, age, the status of socioeconomic, diet, environment and industrialization effects on Urolithiasis(6). In the general population, the frequency of kidney calculi production is approximately 2-3%(7).

Alterations in urinary pH are a risk factor, especially with hyperoxaluria hyperuricosuria or hypercalciuria. With recurrence, hypercalciuria and higher urinary oxalate levels are more common. Hyperuricosuria and Hypercalciuria showed interrelation with a family history of calculus. The ionic connections between various calculi forming salts in the urine of patients are unfamiliar with that in controls and are well represented in calculi composition. Overweight is a risk factor in both genders. Overeating a rich in all nutrients was associated with hyperuricosuria. A diet high only in lipids was associated with other urinary disturbances. High protein and lipid intake both are risk factors. The little or High intake of calcium was associated with urolithiasis, and dietary supplemental calcium is not a risk factor. Magnesium citrate and Potassium are effective in inhibiting the growth of calculi fragments after extracorporeal shock wave lithotripsy. Tap water or low calcium content water is suitable. Drinking hard water must be avoided. Climate fluctuation in temperature affected urinary pH, volume and relative saturation of uric acid. For prevention of recurrence, patients must retain high fluid intake achieving a urine volume of 2 liters per day. Increasing intake of any low-calorie fluid is recommended. A fresh eventual study of 194,095 health professionals found that contributors who devour one or more serving of sugar-sweetened cola per day were 23% more likely to develop stones than those who devour less than one serving per week. Consuming sugar-sweetened non-cola carried a 33% higher risk of nephrolithiasis. Conversely, daily caffeinated coffee intake appeared to decrease the risk of stones by 26%. Decaffeinated coffee, tea, wine, beer and orange juice were also associated with a lower risk of nephrolithiasis(8).

Among renal calculi, Calcium is one component of the most common type. Peoples who get supplement calcium have a high risk as compare to others for developing renal calculi, due to this reason setting of recommended dose of calcium in adults(9). Other factors like electrolytes also influence of the formation of calculi. For example, High urinary elimination of calcium, high intake of dietary sodium may lead to the formation of renal calculi(8). Usually, renal calculi not fatal, but may be fatal due to other complications associated to this. Urosepsis ad death may be attributable to contaminate calculi(10).

Although calcium oxalate stones remain the most common stone type in patients with metabolic syndrome, there has been a considerable raise in the frequency of uric acid nephrolithiasis as well, that appears to be correlated with insulin resistance(11).

Among urinary calculi, calcium oxalate calculi more frequent. About 70-75% calculi consist of calcium oxalate. As compared to women, men are anxious two times more frequently; major chance in people aged 30-50 years. Calcium oxalate calculus develops as a process in which an irregularity between inhibiting forces and crystallization driving plays a vital role. The nutritional reason may be of immense priority in calculi production. Acquired metabolic disorders, as well as inborn errors of metabolism, are essential involving aspects. So are most precisely also calcifications in subepithelial, and calcium phosphate is also part of calcium oxalate calculus. Calcium oxalate found in two distinct forms. Calcium Oxalate Monohydrate is solid and of black or brown color. The high amount of urinary oxalate favors its production. However, high amounts of calcium and magnesium result in Calcium Oxalate dehydrate stone formation(12, 13).

Clinical symptoms are, of course, similar to those encountered in other obstructive processes: hematuria, urinary tract obstruction & characteristic abdomen pain(14).

Drinking enough water is one of the finest ways of preventing kidney stones. Formation of cleared urine is a sign of getting enough fluids to the body. Proper lifestyle and medication may prevent the reformation of kidney stones. Restrict the oxalate-rich foods like spinach, rhubarb, okra, sweet potatoes, tea and soy products. Reduce the salt intake in the diet. Keep on eating calcium-rich nourishments(15-20).

Renal calculi can be diagnosed via history and information collected from the history and gross examination, radiographic studies, and urinalysis(21). The stone analysis is done by a chemical method, infrared spectroscopic study & X- diffraction. In this study chemical, stone analysis kit (Merck) was used to identify the chemical composition of 80 renal stones.

2 METHODOLOGY

The study included 320 kidney stones obtained by the surgical intervention of renal calculi patients, radiographically and clinically diagnosed at the Bahawal Victoria Hospital, Bahawalpur. The stones obtained from the urology department to the chemical pathology laboratory were washed with distilled water for the sake of cleaning, weighed and dried. Stones were chip and crushed; By adopting standard methods, powdered was qualitative measured for chemical examination. The committee of Institute approved the plan of research. Bar Charts, frequency and percentage were made by MS Excel.

3 RESULTS

My study showed that out of 320 patients, calcium oxalate stones were in 208 patients. Uric acid, pure calcium oxalate, calcium phosphate stones were in 76 patients, magnesium ammonium phosphate (struvite) stones were in 16 patients, pure calcium phosphate stones were in 12 patients & cysteine acid stones were in 08 patients. Pure Calcium oxalate stones are found to be more common in adult males of Bahawalpur. The frequency of different types of the ratio of calculi minerals found in my study shown in Table no.1 & Figure no.1. Relative & Absolute Count shown in a sequence in Table no.2

Table I : Distribution of types of renal stones in no. of patients.

Types of stones	No. of patients	Percentage
Pure calcium oxalate stones	208	65%
Uric acid+ calcium oxalate+ calcium phosphate stones	76	24%
Magnesium ammonium phosphate (struvite) stones	16	05%
Cysteine acid stones	12	04%
Pure calcium phosphate	08	02%
TOTAL	80	100%

Table II: Relative frequency & Absolute count of Age interval.

Interval of age (years)	Relative frequency	Absolute Count
15-20	1.25%	04
21-25	2.5%	08
26-30	3.75%	12
31-35	11.25%	36
36-40	21.25%	68
41-45	28.75%	92
46-50	31.25%	100
Total	100%	320

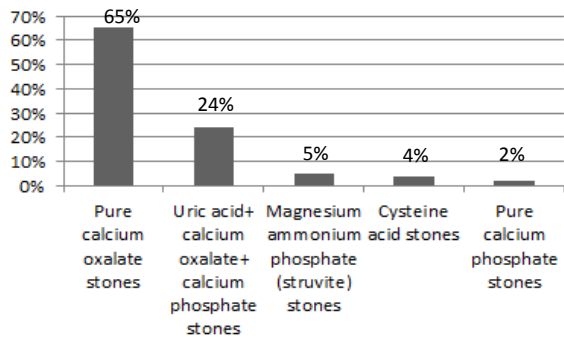


Figure no.1: Percentage of different type of calculi in no.of patients.

4 DISCUSSION

The renal stone disease is most common entity of surgical & urology department. Several studies have been manipulated in many parts of the world by different surgeon, to look into the structure & biochemistry of renal stones.

Current results confirmed other studies like that a pure calcium oxalate stone is common in Bahawalpur that is 65% & 33% in studies conducted by E.J. Westbury(5)(1974), A. Kambal(22) (1979). 60% in Z.A. Hashmi (1999)(23). 69% in Anissa Shariff , Pushpa Durgawale, Anup Hendre, Sangita Patil, Ajit Sontakke (2010) in Karad India(24). It may be due to increase intake of cereals & vegetables in Bahawalpur, and other factors includes hot climate & high level of minerals in the water.

In a study held in the year 2010 Arun Pandeya, Biochemistry Department, Nepal Medical College, Kathmandu, Nepal(25), 99 kidney stones were analyzed, 70% were Calcium oxalate. Kidney stones have multifactorial causes in Nepal, but some predisposing conditions include environmental factors, like diet, play a momentous role in the elucidation of the tendency towards calculi formation. Diet rich in oxalate or purines and high content of calcium in water can lead to excessive excretion of oxalate, calcium and uric acid in urine.

In a study held in a year from December 2001 to September 2002, on enrolling patients admitted to the urology department at Al-Kadimiya Teaching Hospital, Al-Nahrain College of Medicine, Baghdad(26). Seventy-two stones were collected, out of 72 stones, 76% were Calcium Oxalates. Patient's history showed that causes should be recurrence of infection, high level of minerals in water and genetic defect.

In a study held in India, 2010 in Biochemistry department, In karad India, Krishna Institute of research and medical sciences, 69% Calcium Oxalate stones were reported.

In a study held in Pakistan 1989-1999, Hafiz Allah Nawaz, Ghazala Bashir and Zahid Ahmad Hashmi. Department of Surgery, Gomal Medical College, D. I khan, Pakistan(23). 200 renal stones were chemically analyzed over the course of ten years. These calculus were surgically removed in three different institutions. Calcium oxalate stone was more common in that part of the country i.e. 60%.The frequency of renal stones is higher in a hot climate & insufficient drinking water. When I compare my results , they are in the range of other studies that are 65% in my study & 33-76% in another study.

The result of current study also shows that pure calcium phosphate stones, cysteine & struvite stones are less common in Bahawalpur. Calcium phosphate stones are 2%, cysteine stones are 4% & struvite stones are 5% reported. Uric acid stone 24% as compared to multinational studies which show cysteine stone in 1-3% % uric acid stone 5-10%(27). It may be due to high intake of protein like in western society(28). While magnesium, ammonium, and phosphate (struvite) kidney stones results are compared with other studies i.e. 6% of our studies & 10-15% in other studies.

Renal stones should be properly analysed before restricting the diet of the patient. Moreover, required to find the cause of renal stones & its chemical composition to have a better understanding of this disease.

Awareness about the risk factor of kidney stones among the patients and the general population can be achieved by health education programs involving mass media like newspapers, TV, radio, and internet. These programs should focus on lifestyle modifications such as diet control and purified water usage. Public lectures, seminars, symposia & pamphlets can also help to increase awareness about the risk factor of kidney stones. Patients should be warned of complications of the disease and motivated for regular blood calcium level test & complete urine examinations, six monthly kidney check-up. Altered eating and drinking habits promote calcium calculi in these individuals. Information gained in this regard will help health care provider to look risk agent in this area, to make plans for the prophylactic measures to scale down the urolithiasis incidence and contribute to prevent recurrence of calculi formation.

My recommendation is that need of further study in the; Educated, uneducated, rural and urban populations separately in Bahawalpur.

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6 CONCLUSION

To conclude, renal disease is a common pathology in the Bahawalpur region of Pakistan. The frequency of renal calculi is higher in areas of the hot climate, insufficient drinking water & presence of minerals & different types of metals in water. Calcium oxalate calculi are the commonest renal calculi in Adult male in Bahawalpur region of Pakistan. Pure Calcium oxalate calculus is abundant in adult males of Bahawalpur. It is due to hot climate; peoples are vegetarian. The water of Bahawalpur contains high levels of minerals. Most people are not using purified water. They have not cared about diet which causes renal stones.

Conflict of Interest

The article is unique and never published before in any journal.

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