

International Journal of Pharma and Bio Sciences

RESEARCH ARTICLE

BIO CHEMISTRY

ANALYSIS OF UROLITHS (URINARY STONES)

VINODCHANDRAN¹, PRASANNACHANDRA M², UDAY NARAYAN SINGH³, SREEKANTHA *⁴, YOGESH B⁵, REMYA⁶, VIVIAN D'SOUZA⁷ AND BENEDICTA D'SOUZA⁸

^{1,4,5,7,8}Department of Biochemistry and Pharmacology⁵, Manipal University, KMC, Mangalore. India.

^{2,6}Department of Biochemistry and Anatomy⁶, Nitte University, KSHEMA, Mangalore, India.

³Department of Biochemistry, Narayan Medical College, Jamuhar-Sasaram, Bihar, India.



SREEKANTHA

Department of Biochemistry, Manipal University, KMC, Mangalore. India

*Corresponding author

ABSTRACT

Stone(s) or calculi in the urinary tract are referred as urolithiasis. Clinically they usually presents with acute abdominal pain, urinary obstruction and hematuria. In present study we have analyzed 50 patients with uroliths for the chemical composition to know their cause, complications and measures for the preventing the occurrence of urolithiasis. We found that 90% of uroliths found to be calcium related stones and 10% were uric acid stones. Metabolic dysregulation, diet and environmental factors have a causative role in the etiogenesis of urolithiasis.



KEY WORDS

Urolithiasis, chemical analysis, complications, prevention.

INTRODUCTION

Urolithiasis means stone(s) or calculi in the urinary tract; kidney, ureter, urinary bladder and urethra. The term nephrolithiasis can be used to denote the presence of calculi in the kidney(s). Nephrolithiasis pain is radiated to the back and lumbar region. Stone(s) in the ureter present with acute abdominal pain which radiates to groin and genitals. Vesicle calculus refers to bladder stone, presents with vague pain and discomfort in supra pubic region (1).

Calcium stones are most common type of stones (75-85%), Uric acid stones (5-8%) occurs in males and magnesium stones (10-15%) usually occur in females. Calcium stones are most common type of stones; the average age of onset is in between 20 to 30 years. They may have familial background. Calcium oxalate stones exhibit the property of birefringence which means, these crystals appear bright against a dark background with an intensity that is dependent on orientation. Uric acid stones are radiolucent and they are more common in men. Magnesium stones occur mainly in women and potentially dangerous as they have sharp edges which may damage the mucus membrane and they can grow very large in size and may present with obstruction. They usually occur because of the infection in urinary tract due to proteus bacteria. In majority of the cases small stones (2-3 mm) are discovered during the course of radiographic studies for unrelated reasons. They are asymptomatic depending on the position of stone location. Urolithiasis is mainly explained by the imbalance of water and salt ions. The main function of the kidney is to preserve the water and excrete materials having low solubility. These two factors are to be balanced and adjusted with climate, diet and activity of the individual. If any imbalance between the above

mentioned factors results in urolithiasis (2,3). The other causes of urolithiasis include idiopathic hypercalcemia, hyperuricemia, primary hyperparathyroidism, renal tubular acidosis, prolonged immobilization etc (4). Complications of urolithiasis include infection, hematuria, obstruction, hydronephrosis, diverticulum, ulceration and chronic undislodged stone may predispose for malignancy of the site of urinary tract (1).

MATERIALS AND METHODS

50 patients diagnosed with urolithiasis were selected for the study. All subjects were males between 25 to 50 years. All of subjects were fish eaters and staying in the coastal region. The selected patients were diagnosed urolithiasis by classical ultrasound (USG) by Seimen's company. After surgery of nephroliths and flushing therapy for uroliths present in ureter and bladder were selected and analyzed chemically for their composition. The stones from the operation theater or after flushing (dropped out) were brought in formalin for the medical biochemistry laboratory and analyzed for calcium, phosphate, oxalate, ammonia, uric acid and magnesium(5). All routine blood and urine parameters observed in these patients were within normal limits; mainly the serum calcium and uric acid levels.

RESULTS

Out of 50 uroliths, 45 uroliths were positive for calcium oxalate, calcium phosphate and ammonium sulphate, 5 uroliths were positive for uric acid. The results from above study made that 90% of our study population were



positive for calcium, oxalate, phosphate and ammonium sulphate and 10% were positive for

uric acid.



Picture showing calcium and uric acid stones.

DISCUSSION

Urolithiasis is the disease of urinary tract, where there is stone formation; which presents with acute abdominal pain, infection and related complications. Urolithiasis might be easily prevented with a little knowledge, knowing the causes for which is our main purpose of study. In our study we noted that 85-90% of patients had Urolithiasis which composed of mainly calcium oxalate, calcium phosphate and ammonium sulfate and the remaining 10% of uric acid and its salts.

In coastal region people sweat more, and hence they are dehydrated easily. Food habits like eating fish and sea foods which are rich in calcium may precipitate calcium stone formation. Consuming high content of purine rich foods like meat, fish, poultry, tomatoes etc increases uric acid content and dehydration precipitates the formation of uric acid stone with its salts.

The management of stone(s) depends on the position and size of stone. If the stone(s) present in ureter with less than 7mm size, they can be made forcefully descended by flushing procedure by intravenous fluids. If the stone(s) size are more than 8 mm, they are to be removed by surgery depending on the position of calculi by trained urologist and if they are in ureter they are to be removed by basket procedure (1,6).

To conclude, urolithiasis can be easily prevented by maintaining adequate hydration in the form of consuming about 5 liters of water, keeping oneself active by playing or regular walking and limiting the food items which are rich in purine content like red meat, tomatoes etc and avoid drinking excess of tea and drinking cranberry juice often limits the development of stone(s).



REFERENCES

1. S.Das. A concise textbook of surgery, Published by Dr.S.Das. Culcutta, 2006, 4th edition, pp 1205-1215.
2. Fauci, Braunwald, Kasper, Hauser, Longo, Jameson, Loscalzo. Harrison's principles of Internal Medicine, Mc Graw Hill publishes, USA, 2008, 17th edition, 281 chapter, pp1815 – 1820.
3. Coe FL, Parks JH, Asplin JR .Medical progress and Pathogenesis and treatment of kidney stones, NEJM 1992; 327:1141-1152.
4. R.C.G Russell, Norman S. Williams, Christopher J,K. Bulestode, Bailey & Love's short practice of surgery, Arnold Publishers London, 2004, 24th edition, pp 1315-1323.
5. Herold Warley, Practical clinical Biochemistry, W.H Medical books Ltd London, 1984, 5th edition, pp 850-898.
6. Bihl G, Meyers A. Recurrent renal stone disease-advances in pathogenesis and chemical management. Lancet 2001; 358:651-656.