

Study of Renal Stone Composition, Its Association to Geographic Locality and Subclinical Metabolic Syndrome

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Abstract: Randomized study on the prevalence of Renal stone composition by renal stone chemical analysis. The evaluation of patients having renal stone disease giving orientation to urologists towards etiology and avoid recurrence of renal stone disease in association with geographic locality and subclinical metabolic syndrome.

Objective under study: Renal stones of 100 patients send by urologist are post-operative stone samples to Bio-Chemistry lab are subjected to manual chemical stone analysis.

Duration: One year.

Keywords: Urolithiasis, metabolic syndrome, Chemical Renal stone analysis, Calcium oxalate stones, and Uric acid stones.

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I. Introduction

Renal calculi have worldwide distribution but are particularly common in some geographical local countries like United States, South Africa and India. Approximately 2% of the population suffers with renal calculi disease with male to female ratio 2: 1. Peak incidence is observed in 3rd-5th decade of human life (30-50 years). Urolithiasis is a very frequent finding in India, Renal calculi are becoming a most common problem because of living nature of people. The occurrence of renal stone is usually believed to be due to crystallization of minerals inside urine which act as nidus for more sedimentation. Finally, this results in formation of stone within the kidney. Calculi are due to abnormal collection of certain chemicals like oxalates and uric acid.

Renal stones are identified into three groups:

1. Pure calculi – single constituent
2. Mixed calculi – composed of two or more constituents
3. Foreign body calculi – Formed on foreign body

Renal stones are solid masses made of crystals in urinary tract. National institution of Diabetes and kidney disease (NIDKD) reports that about 1 million in United States every year got affected by renal stones. Types of Renal stones that are commonly seen are:

1.1 Calcium oxalate stones

Calcium phosphates are made up of oxalates which are naturally occurring substance found in food like leafy vegetables, nuts, chocolates and fruits. Calcium oxalate can be found in monohydrate and dehydrate calcium oxalate is very common urinary deposit found in the urine of normal people most likely to appear in slightly acidic urine P^H 6.0. Calcium oxalate stones are numerously small in size, irregular shaped crystals. Oxalic acid is widely distributed in plant kingdom ingested by considerable amount in mixed diet. Calcium salts of oxalic acid being highly insoluble forms calcium oxalate stones.

1.2 Uric Acid stones

These stones are seen most common in men than woman. These are observed in people who don't drink enough liquids and with high protein diet. It can also occur in people with Gout.

1.4 Struvite Stones

These stones are seen most common in women who have urinary tract infection. Large struvite stones can cause urinary obstruction.

1.5 Cysteine Stones

These stones are seen very rare. These occur in both men and woman who having genetic disorder cystinuria and also who take drugs like acyclovir and triamterene.

1.6 Pre-Disposing factors

1. Urinary Stasis
2. Defective diet

1.7 Risk factors

Dietary risk factors associated with increased stone formation.

1. Low fluid intake
2. High intake of animal protein
3. High dietary sodium/salt intake
4. Excessive intake of refined sugars
5. Foods having rich oxalates
6. High intake of grape fruit juice
7. Water fluoridation – Fluoride water is responsible for renal stone formation
8. Low calcium intake

II. Materials and Methods

2.1 Collection of samples

Men and women who were selected of age between 30 and 50 years, who are

1. Physically healthy
2. Not taking any drugs
3. Sub clinical obesity is present
4. Sedentary life style
5. Fluoride water area
6. People with less water intake.

Most of these samples were collected from Software engineers, teachers, computer employees and farmers.

2.2 Methods

1. Physical Methods

Measure the size, observe shape, surface, appearance and color.

2. Chemical Methods

Sample stone is first washed with water and then dried in a incubator. Then the sample stone is grinded as powdered form then dissolved in concentrated nitric acid

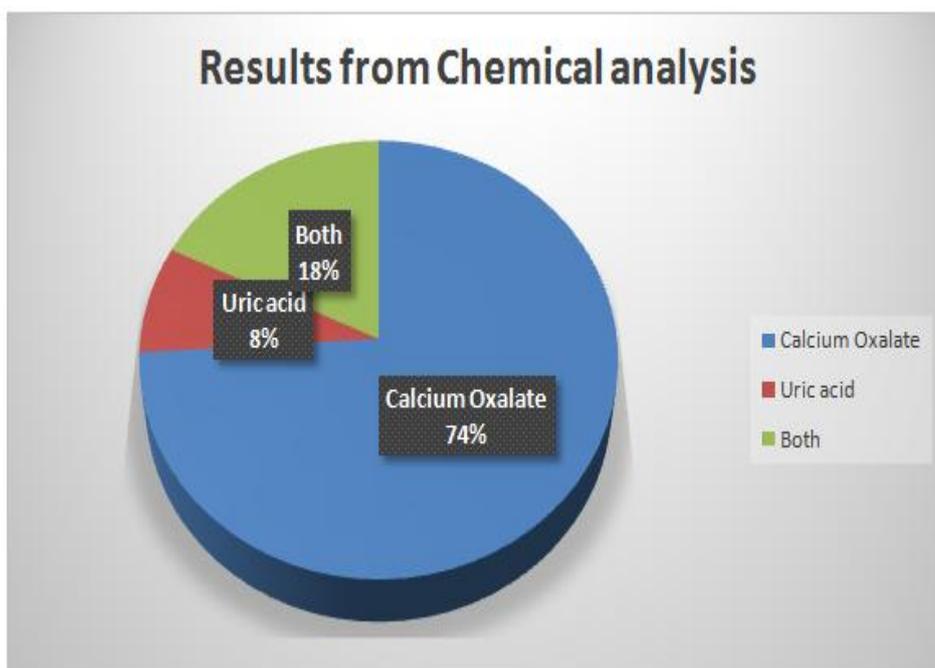
Test	Procedure	Observation
P ^H	Sample + Universal indicator	Yellow – Red - Acidic
		Green – Neutral
		Blue - Alkaline
Calcium Oxalate	Sample + HCL + NaOH + Potassium permanganate	Dissolves color
Uric Acid	Sample + NaoH + Phosphotungstic acid	Deep blue color

Randomly collected 100 sample stones which are sent by urologists subjected to manual chemical stone analysis. These samples are from coastal areas of Andhra Pradesh.

III. Results

In this study samples selected with healthy, sub clinical obesity, sedentary lifestyle, fluoride water area and with normal renal biochemical parameters but suffering with renal calculi because of dietary habits, low water intake, sedentary habits, subclinical obesity and fluoride water area.

Total number of samples are 100 renal stones received in 1 year duration have been analyzed. Out of them 74 samples are calcium oxalates purely, 8 samples are uric acid purely, 18 samples are combination of uric acid and calcium oxalate.



IV. Discussion

According to modern science the formation of renal stone is one of the common disease in urology in both men and woman due to abnormal collection of calcium oxalates and uric acid in the age group 30-45 years. To avoid the incidence of recurrence the life style and diet of the patient have to be changed. As per medical management "prevention is better than cure" in addressing the underlying cause and expulsion of stone because renal calculi has a peculiar tendency of recurrence as surgery is invasive procedure. This study of quantitative method of stone analysis by knowing of precise stone composition avoid recurrence by increasing intake of fluids, avoiding fast foods, high protein diet and spinach of oxalate food.

V. Conclusion

In this analysis, the most common stone composition was calcium oxalate followed by uric acid and combination of both. Remaining stones like phosphate stones cysteine stones are absent. In this study 100 samples are taken out of that 74 stones are calcium oxalate stones 8 uric acid stone 18 are combination of both calcium oxalate and uric acid. The main reason is high protein diet from the dietary point of view like meat and meat products resulting in uric acid stone formation in the urinary tract. In this study, samples are collected from healthy persons that is patients are not diabetic, non-hypertensive, Non-smoker and non- alcoholic with waist circumference in normal range. Sub-clinical obesity and less fluid intake lead to concentrated urine results in stone formation. Also, fluoride area is also supporting factor for stone formation, so patient should improve their lifestyle in all aspects of physical activity, dietary habits by consuming fiber diet, fruits, vegetables, increase water intake to avoid recurrence of renal stones.

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