

## BIOCHEMICAL ANALYSIS OF STONES IN CASES OF URINARY TRACT CALCULUS

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### Abstract

**Background & Method:** The present study was conducted at Department of General Surgery, Index Medical College, Hospital & Research Center, Indore (M.P.). A total of 30 study subjects (post operated cases of urolithiasis) were selected from the surgical ward in Index Hospital from period of 12 months with an aim to Biochemical Analysis of Stones in cases of Urinary Tract Calculus.

**Result:** A total of 46 renal stones were analyzed, from 30 patients. In 30 patients, 18 were Males and 12 Females. The Biochemical analysis of renal stones revealed the presence of mixed stones with highest present of Calcium Oxalate stones, followed by uric acid stones.

**Conclusion:** This study demonstrated that in Index Medical College and Hospital a significant proportion of renal stones were containing calcium oxalate as constituent and were non phosphate in composition. The study concluded that the biochemical composition of renal calculi is important during the treatment of renal stone disease and reducing the recurrence by avoiding promoters of stone formation.

**Keywords:** Biochemical, Stones, Urinary Tract & Calculus.

## Introduction

Urolithiasis is a common urological disease. It is one of the oldest disease known to human beings. Urolithiasis are caused due to multi-factorial reasons. Renal colic presents as acute emergency in casualty with patients in severe pain[1]. Urinary tract stones may occur from either derangements of urine biochemistries or anatomic abnormalities of kidneys and urinary tract. Genetic, environmental and dietary factors may also cooperate in the pathophysiology of urolithiasis. The prevalence and incidence are estimated to be 5-10% and 100-300/1,00,000/year, respectively. Relapse occur in 50-70% of all cases. At present the prevalence occurs in ratio of 15% in men and 6% in women.

The rationale for the investigation on the urinary composition of stone forming patients comes from the assumption that derangements of urine biochemistries may play a pivotal role in the pathogenesis of urolithiasis[2].

One of the major causes for acute and chronic renal failure is the stone formation which includes both nephrolithiasis and Urolithiasis.

Despite urolithiasis is a multifactorial disease, the study of the propensity towards the crystallization of stone forming salts in urine still remains the easiest strategy for the

urologist to estimate the propensity towards the relapses of stone disease in individual patients[3]. In this paper, we described the biochemical analysis of the stones done in cases operated for urolithiasis in our institute[4]

**Objective:** To study and determine the composition of stones by biochemical analysis in cases of urinary tract calculus.

### Material & Method

The present study was conducted at Department of General Surgery, Index Medical College, Hospital & Research Center, Indore (M.P.). A total of 30 study subjects (post operated cases of urolithiasis) were selected from the surgical ward in Index Hospital from period of 12 months (August 2019 to August 2020). Biochemical analysis of stones which were removed was done.

### Inclusion criteria

Patients with clinical features of urolithiasis with radiological confirmation of calculus disease and whose stones were removed and sent for biochemical analysis were included in this study.

## Results

**Table 1: Types of calculi & it's incidence**

Calculi	Calcium Phosphate with Uric Acid	Calcium Oxalate	Calcium Oxalate with Struvite	Calcium Oxalate with Uric Acid	Calcium Phosphate with Struvite	Cysteine	Struvite	Uric Acid	Xanthine	Total
Bladder Calculi	0	5	1	0	1	1	1	2	1	12(27%)
Kidney Calculi	1	12	5	2	1	1	2	3	0	27(57%)
Ureteric Calculi	0	2	1	1	0	1	1	1	0	7(16%)
Total	1	19	7	3	2	3	4	6	1	46
	(1.8%)	(44%)	(16.3%)	(5.4%)	(3.6%)	(5.4%)	(7.2%)	(14.5%)	(1.8%)	(100%)

A total of 46 renal stones were analyzed, from 30 patients. In 30 patients, 18 were Males and 12 Females. The Bio-chemical analysis of renal stones revealed the presence of mixed stones with highest present of Calcium Oxalate stones, followed by uric acid stones.

**Table 2: Association of Calculi with Phosphate stones**

Calculi	Non-phosphate Stone	Phosphate Stone	Total
Bladder Calculi	11	1	12(27%)
Kidney Calculi	25	2	27(57%)
Ureteric Calculi	7	0	7(16%)
Total	43	3	46
	(93.4%)	(6.52%)	(100%)

**Table 3: Association of Age with calculi**

Age	Bladder Calculi	Kidney Calculi	Ureteric Calculi	Total
<20 Years	2	4	1	7(14.4%)
21-40 Years	7	14	4	25(54.5%)
41-60 Years	3	6	2	11(23.6%)
>60 Years	1	2	0	3(7.2%)
Total	13	26	7	46
	(27%)	(57%)	(16%)	(100%)

**Table 4: Association of Sex with calculi**

Sex	Bladder Calculi	Kidney Calculi	Ureteric Calculi	Total
Male	7	14	4	25(54.5%)
Female	6	12	3	21(45.5%)
Total	13	26	7	46
	(27%)	(57%)	(16%)	(100%)

## Discussion

Incidence of calculi is higher in the age group of 21-40 years that is 54.5%, 25 out of 46 calculi were seen in this age group[5]. It was followed by 41-60 years age group which has incidence of 23.6%. Calcium oxalate is seen as single composition in 19 out of 46 calculi that is 44%. Calcium Oxalate with Struvite was seen in 7 out of 46 calculi that is

16.3%. It was followed by uric acid stones which were 6 out of 46 calculi that is 14.5%.

It was noted that 65.75% of stones contained calcium oxalate (Calcium Oxalate, Calcium Oxalate with Struvite And Calcium Oxalate with Uric Acid) as main constituent making it major component of stone composition[6].

43 calculi out of 46 calculi were Non-phosphate stones that is 93.4%, While number of phosphate stones were 3 out of 46 stones that is 6.52%. Dominance of non-phosphate stones was seen in all age groups, similarly calculi were found in kidney in majority of all age groups[7].

Majority of stones were found in kidney 26 out of 46 calculi that is 57%, followed by bladder 13 out of 46 calculi that is 27% and lastly in ureter 7 out of 46 calculi that is 16%. Our study shows that the incidence of stones was higher in males (54.5%) than in females (45.5%). Incidence of bladder calculi was higher in females whereas incidence of kidney and ureteric calculi was higher in males [8].

### Conclusion

This study demonstrated that in Index Medical College and Hospital a significant proportion of renal stones were containing calcium oxalate as constituent and were non-phosphate in composition. The study concluded that the biochemical composition of renal calculi is important during the treatment of renal stone disease and reducing the recurrence by avoiding promoters of stone formation.

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