



**ORIGINAL RESEARCH PAPER**

**Biochemistry**

**URINARY pH IN DIFFERENT TYPE OF URINARY STONES**

**KEY WORDS:**

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**ABSTRACT**

**INTRODUCTION** -In addition to metabolic disorders pH of urine plays an important role in the formation of urinary calculi. Different calculi precipitate at different pH and this fact may become a corner stone for prevention of occurrence and prevention of recurrence in stone formers.

**AIMS AND OBJECTIVES** -We have therefore in a humble way carried the work on and assimilated strength from an old saying that prevention is better than cure.

**MATERIAL AND METHODS** -25 cases of stone formers were selected for the study. The pH range of urine samples were noted by pH paper and its reaction by Litmus paper. Urine samples were also examined physically and chemically within one or two hours of collection.

**RESULTS** -Calcium oxalate (Type I), uric acid & urate (Type IV), Cal. oxalate+Triple phosphate (Type V) & calcium phosphate+Col-oxalate (Type VI) were found in urinary pH ranging from 5.5-7.0. While Triple phosphate (Type II), Calcium phosphate (Type III) and Triple phosphate + Cal-carbonate (Type VII) were formed in urinary pH ranging from 6.5-8.0.

**CONCLUSION** -It has been concluded that urinary pH has profound effect on kidney's ability to secrete or reabsorb metabolites and solutes that contribute to the risk of stone formation. Urinary pH test is an important screening test for urinary stone formers, and important consideration should be given to its control.

**INTRODUCTION:-**

In addition to metabolic disorder pH of urine plays an important role in the formation of urinary calculi. In health the urine pH ranges from 4.3-8. Different type of stones precipitate at a particular pH range.

An alkaline urine tends to increase the precipitation of calcium phosphate Brushite and Apatite. These stones may form in patients with renal tubular acidosis. An alkaline urine is also produced by the presence of urinary tract infections by urease producing bacteria, usually proteus species Struvite (Mg NH<sub>4</sub>PO<sub>4</sub>) precipitate out in these patients.

Uric acid and cystine calculi precipitate out in acidic urine. The solubility of calcium oxalates is not influenced by changes in pH.

**AIMS AND OBJECTIVES:-**

**RESULTS:**

**Showing range of pH of urine in different type of urinary calculi**

Range of pH	I CAL.OX	II Tr. Phosphate	III Cal.phosphate	IV Uricacid+ urate	V Cal.Ox+Tr. phosphate	VI Cal.phosphate +cal.ox	VII Triple phosphates Cal.Carb
5-5.5							
5.5-6.00			1	1			
6.0-6.5	5		2	2	1		
6.5-7.0	3	1			1	3	
7-7.5		3					
7.5-8.0							2
8.0-8.5							
	8	4	3	3	2	3	2

We have carried out this work and have assimilated strength from an old saying that prevention is better than cure. Many workers, taking into account the nature of urinary stones, the serum levels of calcium, phosphorus and uric acid and also the urinary pH have pointed out different preventive aspects with an emphasis on different dietary substances ingested by human beings and amount of water drunk by them. Even if they are relieved of their stones they are advised particular dietary restrictions.

**MATERIALS AND METHODS:-**

25 cases of stone were selected for the study.

The pH range of urine sample were noted by pH paper and its reaction by litmus paper.

Urine samples were also examined physically and chemically within one or two hours of collection.

**Types of stones formed in acidic & alkaline pH value**

Type pH value	I	%	II	%	III	%	IV	%	V	%	VI	%	VII	%
Acidic	8	100%	1	25%	0	0.0%	3	100%	2	100%	3	100%	0	0%
Alkaline	0	%	3	75%	3	100%	0	0%	0	0%	0	0%	2	100%
Total	8	100.0	4	100.0	3	100.0	3	100.0	2	100.0	3	100.0	2	100.0

**DISCUSSION:-**

An alkaline pH favours the crystalization of calcium & phosphate containing stones, whereas the acidic urine pH promotes uric acid or cystine stone.

The activity of many transport processes involved in calcium, citrate and phosphate handling are sensitive to changes in systemic or local pH as shown for several phosphate transporters the citrate transporter NADC1 & the TRPV5 calcium channel.

Isohydriuria i.e, fixation of pH over a normal range throughout most of a 24 hr cycle, with a loss of normal acid alkaline tides. These tides normally fluctuate widely over a range of pH 4.5 to 7.5.

Three types of isohydriuria are described

- (i) Acid type (pH 4.5 to 5.5) is associated with precipitation of uric acid.
- (ii) Mild acid to neutral type (pH 5.5-6.0) is associated with precipitation of calcium oxalate.
- (iii) Alkaline type (pH 7.0 to 7.5) is associated with precipitation of phosphates.

Singh et al (1995) have shown the major Biochemical characteristics in renal tubular acidosis compared to without RTA were

- (a) Significantly higher urinary pH.
- (b) Significantly lower excretion of citric acid.
- (c) No significant difference in calcium excretion &
- (d) a tendency towards lower titrable acidity and ammonium excretion.

**CONCLUSION:-**

Urinary pH has profound effects on Kidney's ability to secrete or reabsorb metabolites and solutes that contribute to the risk of stone formation.

Very little is known how changes in local pH translates into changes in transport function. Whether transport molecules and ion channels are intrinsically pH sensitive or whether the pH change triggers regulatory cascades affecting renal function.

Additional mechanisms may also contribute to stone formation.

Potential stone formers may therefore one day gain from these works, as their early identification and imposition of certain restrictions may save them from suffering from a disease ranked by some next only to malignancy.

To raise the pH it is recommended to take pot. citrate tablets, drink water above 2.5 liters/day. A diet rich in citrate fruits, most vegetables and legumes will keep the urine alkaline.

A diet high in meat & cranberry juice will keep the urine acidic.

Urinary pH test is an important screening test for urinary stone formers.

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