

Study of Serum Calcium, Phosphorous and Uric Acid Levels in Patients of Urolithiasis: Study on Rural Population of Maharashtra

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ABSTRACT

Urolithiasis is a common clinical disorder marked by kidney stones. The formation of stones in the urinary tract i.e. urolithiasis stems from a wide range of disorders affecting large number of population worldwide. So, this study was undertaken to determine the levels of Calcium, Phosphorous and Uric acid in the serum of patients of urolithiasis to prove any association amongst them.

This prospective study was carried out over a period of 2 months where quantitative methods were used. The total number of individuals included in our study was 80. These individuals were divided into 2 groups of 40 each (cases and controls respectively).

Urinary calculi were more prevalent in 22 to 35 years of age. By applying test of significance for serum Calcium, Phosphorous and Uric Acid levels in comparison with that of controls P value for Serum Calcium was 0.011, that of serum Phosphorous and Uric Acid was 0.631 and 0.715.

None of our patients with urolithiasis had abnormal serum biochemical parameters but raised levels of serum Calcium was significantly associated with urolithiasis compared to controls.

Keywords:- Urolithiasis, Serum Calcium, Phosphorous, Uric acid

INTRODUCTION

Urolithiasis is a common clinical disorder marked by kidney stones. [1] The formation of stones in the urinary tract i.e. Urolithiasis stems from a wide range of disorders affecting large number of population worldwide. [1] Renal stone prevalence has increased from 3.8 to 5.2%. [2] It might be because of more and more number of patients being diagnosed because of newer diagnostic modalities like USG, Intravenous pyelography, Cystoscopy, lifestyle changes particularly less drinking of water, drinking of hard water and irregularity in diet. [1,3]

Certain areas of world like South East Asia have shown increased number of Urolithiasis patients in recent past. [3] Though, the available resources are plenty for renal calculi treatment worldwide but its prevention is neglected by clinicians and affected population. [4]

So, this study was undertaken to determine the levels of Calcium, Phosphorous and Uric acid in the Serum of patients of Rural Maharashtra (Karad area) where Urolithiasis cases are more, and also to find out statistical correlation amongst the serum values and Urolithiasis.

Aims and Objectives:

The aim of this project is to determine levels of Calcium, Phosphorous and Uric Acid in Serum of patients of Rural Maharashtra (Karad area) where there are plenty patients of urolithiasis.

The Objective is the estimation of these parameters and to establish a correlation and Statistical analysis between them for early detection.

MATERIALS AND METHODS

This is a prospective Study carried in the Departments of Pathology, Biochemistry & Surgery in Krishna Institute of Medical sciences, Karad. This study was carried out over a period of 2 months (1st July to 30th August 2015) where quantitative methods were used.

The study is a cross sectional study & number of individuals included in our study were 80. These individuals were divided into 2 groups of 40 each:

Group 1- Patients diagnosed in the Surgery department with urinary stones (cases)

Group 2- People of similar age and sex matched group without urinary stones (controls)

The diagnosis of these patients was confirmed by *Plain X-ray (Kidney-Ureter-Bladder)*, *Ultrasonography* and/or *Intravenous pyelography*. 5 ml blood samples of these individuals were collected in the above study period. They were collected in plain bulb with vacutainers and were centrifuged to obtain serum. Serum Calcium, Phosphorous and Uric acid levels were estimated with the help of fully automated EM360 Transasia analyser.

Data analysis was carried out between these values by applying the tests of significance and P value was obtained. P value <0.05 was significant to indicate the rise in the values.

OBSERVATION AND RESULTS

A total of 80 individuals were found to be illegible for final analysis. The mean age of patients was 48.22 + out of which 51 (64%) Males and 29 (36%) were females.

Table no. 1. Age and sex distribution of cases and controls.

	Individuals with calculi (Cases)	Individuals without calculi (Controls)	Total
Male	26	25	51
Female	14	15	29
Total	40	40	80

Urinary calculi were more prevalent in 22 to 35 years of age. The mean age of cases being 29.9 years. Out of 40 patients of Urolithiasis 26 (65%) were Males and 14 (35%) were females. The most common site of stone formation was Kidney followed by Ureter and Bladder. The most common presentation was pain in the abdomen which was severe in nature located in loin region.

One patient presented with acute retention of urine. His stone was impacted in the bladder at the urethral orifice. X-Ray (KUB) was the investigation of choice in 35 out of 40 (87.5%) and rest (12.5%) were diagnosed on Ultrasonography. Only 1 patient that presented with acute retention of urine was diagnosed with the help of Cystoscopy of Bladder. Controls were taken by consideration of age and sex of cases. 40 controls were included in our study in which 25 (62.5%) were males and 15(37.5%) were females. The mean age of controls was 30.2 yrs.

The controls were also residing in the rural areas of Karad like Patan, Dhebewadi, Shedgewadi. So, the bias of confoundability was reduced to minimum. Serum Calcium levels of patients were 9.4 ± 1.2 which was mildly elevated while serum phosphorous and Serum Uric Acid were 3.4 ± 0.4 and 5.2 ± 1 was observed. The Serum Calcium level of controls was 7.4 ± 1.1 and Phosphorous and Uric acid were 3.4 ± 0.4 and 5.2 ± 1 .

By applying test of significance for Serum Calcium, Phosphorous and Uric Acid levels in comparison with that of controls P value for Serum Calcium was 0.011, that of Serum Phosphorous and Uric Acid was 0.631 and 0.715.

So, it was concluded that because of P value < 0.05 association of raised Calcium was significantly associated with Urolithiasis. Serum Uric Acid and Serum Phosphorous was not associated with the

development of Urolithiasis because of P value > 0.05.

Table no.2-The levels of serum Ca, Phosphorous, uric acid along with P value.

Serum level	Cases	Controls	P value
Calcium	9.4 ± 1.2	7.4 ± 1.1	0.011*
Phosphorous	3.4 ± 0.4	3.4 ± 0.4	0.631
Uric acid	5.2 ± 1.0	5.2 ± 1.0	0.751

(* Indicates significant P value for Calcium. Significant P value is <0.005; Non significant P value is >0.005.)

DISCUSSION

In the present study, 80 Individuals participated. Male Preponderance was (64%) noted which was comparable with study done by Gyawali PR et. al., [3] Bhale VD et. al. [1] & Jawalekar et. al. [1]

In our patients of Urinary Calculi the Levels of serum Calcium, Phosphorous and Uric Acid were assessed. None of our patients have raised serum Calcium, phosphorous and Uric acid levels which was comparable with study done by Gyawali PR et. al., [3] Bhale VD et. al. [1] & Jawalekar et. al. [1]

By applying test of significance, particularly for Calcium, Phosphorous and Uric Acid level P value for Calcium was 0.011(<0.05) which was found significant. Similar findings were noted by Bhale VD et al. [1] (P value 0.014) & Gyawali PR et al [3] (P value 0.012).

So, our study was in concordance with these two studies. The most common presentation was pain in abdomen (severe in nature localised to loin region). Same findings were observed by Bhale VD et al. [1]

This can be explained by multifactorial etiology of Urolithiasis particularly high non-veg. diet, less drinking of water, consumption of bore well water which is high in salt concentration. In our study there was no significance of any rise or fall in Uric acid or Phosphorous value that compared with the controls. This might be because of higher number of cases with Calcium Oxalate stones.

X-Ray (K-U-B) was the main investigation of choice for diagnosis of Urolithiasis in our study. All radio opaque stones (except Uric Acid stones) were

diagnosed. X-ray was the main modality for diagnosis in study done by Bhale VD et al and Jawalekar et al.

This study was carried out in rural areas of Western Maharashtra where hypocalcemia and hyperuricemia are definitive risk factors of Urolithiasis. [1]

Some studies have shown that particularly study done by Curhan GC et al., there was family history of urinary calculi. [5] But in our study such findings were not found. History of drinking hard water was asked. Almost all Urolithiasis patients gave a history of drinking < 2.5 litres of water per day and that too, bore well water, compared to controls which gave a history of more than 3.5 litres of water per day and that too, normal tap water. This was in concordance with Gyawali PR et al. [3]

Limitations of our study:

We had not taken into consideration biochemical nature of stones which might affect the levels of serum Calcium, Phosphorous & Uric acid. Urine examination was also not carried out as microscopic haematuria may be the earliest sign of Urolithiasis.

CONCLUSION

None of our patients with urolithiasis had abnormal serum biochemical parameters but raised levels of serum Calcium was significantly associated with urolithiasis compared to controls. Drinking less water, hard water is significantly found to be associated with urolithiasis. Non-Veg. diet is also a significant risk factor for the development of renal Stones. Thus to conclude, raised serum calcium level, less drinking of water, drinking of hard water and non-veg diet are significantly associated with urolithiasis.

By applying the test of significance, it had proven that association of elevated serum Calcium level with the formation of renal stones (P value = 0.011, less than 0.05) is found significant. This study had undertaken the risk factors associated with Urolithiasis in Rural areas of western

Maharashtra. This will help to the clinicians, rural population and will be proven useful as a comparative study for future researchers working on Urolithiasis.

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