Study of Serum Calcium, Phosphorus and Uric Acid Levels in Patients of Urinary Calculi

Dhananjay V. Bhale[*], Manjusha D. Hivre[**], Roshan K. Mahat[***], Ashlesha A. Bujurge[***]

[*]Professor and HOD, [**]Asst. Professor, [***]PG Students, Department of Biochemistry

MGM Medical College, Aurangabad, Maharashtra, INDIA.

Corresponding Address:

dr.bhale@gmail.com

Research Article

Abstract: **Background:** Urolithiasis is a common clinical disorder affecting large amount of population worldwide. About 10% of people will experience nephrolithiasis in their lifetime and about 50 - 70% of those will have recurrences. **Objective:** The aim of this study was to identify the level of calcium, phosphorus and uric acid in the blood of patients with urinary stones. **Methods:** This study was conducted over a period of six months (From March to August 2013). It is a descriptive cross sectional study. Serum calcium, phosphorus and uric acid levels were determined with the help of Dimension RxL fully auto analyzer using the kits supplied by Siemens. Data was collected from 30 cases and 30 controls. **Results:** The prevalence of urolithiasis in male patients was 63.3% and 36.7% in female patients ($p<0.05$). Serum calcium in patients and control was 8.1±1.1 and 7.6±1.6 ($p<0.01$) respectively. Serum phosphorus and uric acid in both groups were statistically not significant (p value 0.270 and 0.610 respectively). **Conclusion:** Higher level of calcium in serum was found in patients with urolithiasis in our population. Serum phosphorus and uric acid level in blood serum was not different in the both groups.

Key words: Hypocalcemia, urolithiasis, hyperuricemia.

Introduction

Kidney stone is common problem and population prevalence of renal stones has increased from 3.8% to 5.2% in last two decade.[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. 50% of diagnosed cases of nephrolithiasis experience recurrences in their life time.[2] The prevalence of urinary calculi has been increasing in certain areas of the world like south East Asia in both the sexes. This increases the lifetime risk. Though available resources are plenty for renal calculi treatment worldwide but its prevention is neglected by the affected population.[3] So the aim of this study was to determine the levels of calcium, phosphorus and uric acid in the serum of patients of Marathwada region with urinary calculi.

Materials and Methods

This is a prospective study, conducted in Department Of Biochemistry, MGM Medical College and Hospital, Aurangabad over a period of six months (from March to August 2013). The study is cross sectional study where quantitative methods were used. Samples from total 60 individuals were collected during the study period and they were divided into two groups. Group I- Patients visiting to the hospital with urinary calculi (Cases) - Stone formers and Group II- People of similar age and sex matched group without urinary calculi (Controls) - Non stone formers. All patients with urinary calculi were included in the study but those who needed immediate treatment and females who were pregnant were excluded from the study. 5 ml venous blood sample was collected from both groups and serum was separated after centrifugation at 3000 rpm for 10 minutes. Samples were analyzed with the help of Dimension Rxl Fully Autoanalyzer using the kits supplied by Siemens. Validity and reliability of the study were ensured by standardization and calibration of laboratory methods. The data were categorized according to presence or absence of urolithiasis. Data analysis was done using Statistical Package for Social Sciences (SPSS) version17.0. P value <0.05 was considered significant.

Results

A total of 60 individals (30 cases and 30 controls) were eligible after excluding for final data analysis. The mean age of the patients was 40.2±13.5 years, out of which 38 (63.3%) males and 22 (36.7%) were female.(table 1) Urinary calculi was more prevalent (30%) in 27-36 years of age. A total of 40% patients were diagnosed cases of diabetes mellitus, hypertension and others which were included in our study.

Table 1: showing comparision of individuals with and without urinary calculi

Variables		Individuals with urinary calculi (n= 30)	Individuals without urinary calculi (n= 30)	p value
Age (years)		40.2±14.2	40.1±16.8	0.866
Sex	Male	20	21	0.76
	female	10	09	-
Serum		8.1±1.1	7.6±1.6	0.014*

calcium(mg/dl)			
Serum phosphorus(mg/dl)	3.6±0.8	3.5±0.4	0.621
Serum uric acid(mg/dl)	5.1±1.1	5.8±1.0	0.029*
*p-Value <0.05 statistically significant (Independent student t- test)			

Out of the 30 patients with urolithiasis, 85% of the patients had urinary calculi. The most common site of urolithiasis was kidney. 25% of the patients had history of previous surgery for urinary stones.

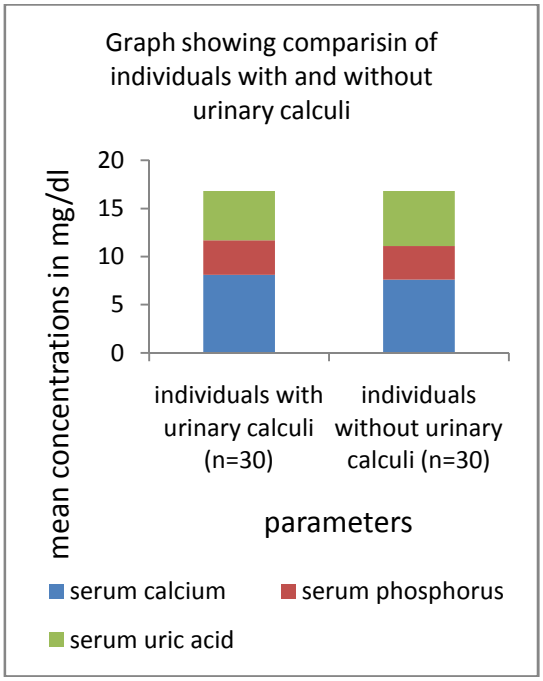

Figure 1: Graphical analysis of results shown in above table

Discussion

In this study, we assessed different serum parameters in patients with urinary calculi. In our patients with urinary calculi, the levels of serum calcium and uric acid were below the normal limits and serum phosphorus levels were within normal limits but the levels of serum uric acids were higher in control group. None of the patients in our study had hypocalcaemia and hyperphosphataemia. We have studied various serum physiochemical risk factors for renal calculi. In our patients with urinary calculi, the levels of serum calcium were below normal limits and were higher than in patients without urinary calculi. Though we have observed raised uric acid levels in patients with urinary calculi, but the levels of uric acid in patients without urinary calculi were found to be higher as compared. (fig. 1) While the levels of phosphorus in both the groups were not statistically significant. Though hypercalcemia and hyperuricaemia are definite risk factors for urolithiasis, in our set up hypocalcaemic and normouricaemic patients have urinary calculi.[4] This can be explained by multifactorial etiology of the urinary stone and some genetic variation in population of Marathwada region. Some studies have shown relationship between family history and risk of urinary calculi formation.[5] There are many studies showing hypercalcemia and hyperuricaemia as risk factors for urolithiasis. Studies have shown that in patients with urolithiasis serum calcium level was significantly higher than that in controls calcium (mmol/l) 4.9 ± 0.21 vs 2.4 ± 0.12 $p < .03$]. However there was no significant difference in serum uric acid level in that study.[6]

Conclusion

Calcium oxalate is the most common type of stone in our perspective. None of our patients with urinary calculi had abnormal serum biochemical parameters. Abnormal serum biochemical parameter alone is not the risk factor for urolithiasis. This different result may have arisen from the special characteristics of our patients (diet, climate, genetics, socio-economic factors, etc.). Not only this, we found higher level of serum calcium in patients with urinary calculi as compared to controls. Though serum phosphate levels were not different in both groups but individuals in control group have hyperuricemia as compared to cases.

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