

Chemical Composition of Urinary Stones, in Stone Passers at Larkana

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ABSTRACT

Objective: To determine the chemical composition of spontaneously passed urinary stones.

Study design: Descriptive.

Place and duration: The study was conducted at public and private Pathology laboratories of Larkana from Jan: 2009 to Dec: 2010.

Patients and methods: Stones of 278 patients were analyzed chemically, using titrimetric method for estimation of calcium and colorimetric method for uric acid and other anions.

Results: Urinary stones of persons ranging in age from 2 to 72 years were determined, having a male to female ratio 2.8:1, the frequency of compounds in stones was calcium oxalate (33.1%), uric acid (18.3%) and struvite stone (7.9%) while percentage of mixed calcium and urate stones were 18% and 22.7% respectively.

Conclusion: Chemical composition of spontaneously passed urinary stones is not different from stones retrieved through pyelolithotomy or by extra corporeal shock wave lithotripsy (ESWL).

Key words: Urolithiasis, Chemical composition, Pakistan.

INTRODUCTION

Urolithiasis is the third most common clinical problem of urinary system^{1,2}, occurring up to 15% of population in the western countries^{3,4}. Due to lack of facilities, correct incidence of urinary stones is not known in Pakistan⁵. However many research workers have observed the progressive increase in number of stone formers not only in Pakistan, but also in certain parts of India^{6,7,8}. Stones are two times more common in males as compared to females⁹. Stone may recur in 50% of cases even after surgical removal¹⁰. Most of the ureteral stones under 5mm pass spontaneously⁹. Determination of chemical composition is an integral part for the proper management and prophylaxis of stone formation^{11,12}. Numerous studies are available on renal stones throughout the world and many have been focused, on the association of renal stones with urinary tract infection (UTI), age, sex, congenital anomalies of the urinary tract^{4,8,11,13,14,15,16,17,18} but very few studies are available in the literature especially in Pakistan regarding composition of urinary stones^{1,11}. None of the study has been done in Pakistan showing the chemical composition of urinary stone passers and their association with age and sex. However this retrospective study was conducted at Chandka Medical College Larkana (CMCL) to look at the

chemical composition of urinary stone passers, which will help the health planners to formulate the appropriate strategy for management and prevention of stone formation.

MATERIALS & METHODS

This was the retrospective descriptive study conducted with approval of ethical committee of Chandka Medical College Larkana. The present study was conducted on 278 patients who had passed urinary stones spontaneously. All these stones were sent to department of pathology CMCL and three private laboratories associated with Asif group of diagnostic services for chemical analysis from Jan:2009 to Dec:2010. All the cases where stone was not passed spontaneously but retrieved either after pyelolithotomy or by extra corporeal shock wave lithotripsy (ESWL) were excluded from the study.

Prior to analysis, the stones were washed with distilled water to remove any attached blood and tissue debris and dried overnight at 70^oC. The stones were crushed to fine powder form in pestel and mortar, and chemical composition of the calculus was determined, using the kit DiaSys diagnostic systems GmbH Germany, by titrimetric method being used for calcium and a colorimetric method used for oxalate, phosphate, magnesium, ammonium, uric acid and cysteine¹⁹. Reports were prepared and analyzed on SPSS version 13.

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RESULTS

A total of two hundred seventy eight cases were collected for this study. There were 204 males and 74 females, with male / female ratio of 2.8:1 (Table-I). The age ranged from 2-72 years with mean age of 32.480± 15.27 SD (Table-II). Majority of cases were over the age of 15 years (table-III). The mean age in different type of stones ranged from 26 to 35 years (Table-IV). Majority of stones in our study were pure calcium oxalate (33.1%) while struvite stones were seen in 7.9% of cases (Table-V). There was significant sex wise difference in types of stones as shown in chi-square test (Table-VI) and table (VII).

Table-I: Sex wise distribution of stone passers.

Valid	Frequency	%	Valid %	Cumulative %
Male	204	73.4	73.4	73.4
Female	74	26.6	26.6	100.0
Total	278	100.0	100.0	

Table-II: Frequency distribution of all cases.

N	Valid	278
	Missing	0
Mean		32.4892
Median		31.0000
Mode		25.00
Std. Deviation		15.27480

Table-III: Age and sex wise distribution of cases

Age in yrs	Male	Female	Total
0-15	16(5.8%)	14(5%)	30(10.8%)
16-72	188(67.6)	60(21.6%)	248(89.2%)
Total	204(73.4)	74(26.6%)	278(100%)

Table-IV: Mean ages of difference stones

Type of stone	Mean	ST Error of Mean
Pure calcium oxalate	32.4891	1.61029
Calcium oxalate mixed	31.2600	1.92509
Uric acid pure	34.9412	2.07533
Uric acid mixed	33.4444	2.20038
Struvite	26.8636	2.46648

Table-V: Frequency distribution in major types of stones

Valid	Frequency	%	Valid %	Cumulative %
Pure calcium oxalate	92	33.1	33.1	33.1
Calcium oxalate mixed	50	18	16	51.1
Uric acid pure	51	19.3	18.3	69.4
Uric acid mixed	63	22.7	22.7	92.1
Struvite	22	7.9	7.9	100
Total	278	100	100	

Table-VI: Type of stones with relation to sex

Type of stone	Male	Female	Total
Pure Calcium oxalate	64	28	92
Calcium Oxalate mixed	37	17	50
Uric acid pure	41	10	51
Uric acid mixed	49	14	63
Struvite	13	9	22

Table-VII: Chi-Square Test.

	Value	df	Asymp. Sig (2-sided)
Pearson Chi-Square	4.902 ^a	4	.297
Likelihood Ratio	4.797	4	.309
N of Valid Cases	278		

DISCUSSION

Urinary tract stones are not an uncommon condition presenting with severe lumbar pain or may be silent, discovered on routine investigations¹⁰. In the present study males were affected more often than females with a ratio of 2.8:1. Our results are comparable with other studies, which have shown more men affliction than women; with a ratio of 2.5:1^{5,17}. The higher incidence of urinary stones in male may be due to increased serum testosterone level⁸. The age of patients in this study ranged from 2-72 years with mean age of 32.48 ± 15.27SD. Our results with regards to mean age are almost similar to study of Jan et al¹⁴. In the present study only 10.8% cases of stone passers were children aged ≤ 15 years. Our results are in contrast with studies of Qaader et al⁴ and Al-Maliki²⁰, who have reported higher frequencies of 21.2% and 41.4% of stones respectively in children and this difference is because they have given the over all incidence of stones in children where over study is limited to stone passers only which will probably be 3-4 times less than the total incidence of stones.

The chemical analysis of urinary stones in our study showed 92 cases (33.1%) containing pure calcium oxalate. Our results are in agreement with study of Rahman et al²¹, who have reported pure calcium oxalate stones in 34% of cases. Different percentages ranging from 26 to 63% have reported in literature^{1,11,13,15,16}, reflecting the influence of certain environmental and dietary factors in the formation of calcium oxalate stones^{1,4}. Pure uric acid stones are radiolucent and tend to occur more frequently in patients of gout, which is associated with purine rich diet¹⁰. In the present study uric acid stones were found in 18.3% of cases, a figure much higher than those reported by farooq et al¹ and Kang¹⁰, and lower than a study conducted at Multan by Rafique et al¹¹. In this study mixed stones containing calcium oxalate plus calcium phosphate and urate with calcium and other anions were observed in 18% and 22.7% of

cases respectively. This is in contrast to reports by Rafique et al¹¹ at Multan, who observed the mixed calcium and urate stones in 10% and 7% of cases respectively. The results regarding mixed calcium stones are generally lower than those reported by Golechha & Solanki (51%)⁸ while Farooq et al¹ observed higher figures of 38.4% of mixed urate stones. Struvite stones are often associated with infection⁴. In the present study these were observed in 7.9% of cases. These results are in conformity with observation revealed by Kang¹⁰ & Rehman et al²¹. However Golechha & Solanki⁸, and Westenberg et al²² have shown higher frequencies of 13% and 20% respectively. Frequency in all types of stones was significantly higher in males as compared to females except in struvite stones, where cases were evenly divided between two sexes, this type of observation is already reported in literature by Kang¹⁰, however most studies are in agreement about the higher incidence of struvite stones in females^{13,23}. More prospective studies are required by including adequate number of cases, in this region to confirm our version.

CONCLUSION

Chemical composition of spontaneously passed stones is not different from other studies who have given the composition of urinary stones retrieved by pyelolithotomy or by ESWL.

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