

Chemical Composition of Urinary Stones in Rahim Yar Khan and adjacent Districts of Sindh and Baluchistan

A HAKEEM M TARIQ M BARI M H ABBAS. M ANWAR

Department of Pathology Sh. Zayed Medical College/ Hospital, Rahim Yar Khan

Department of Surgery Sh. Zayed Medical College/ Hospital, Rahim Yar Khan

Correspondence to Dr. Abdul Hakeem Assistant Professor Pathology & Dr .M. Hassan Abbas Senior Registrar Email:- drhassanabbas@yahoo.com

Aim: To find out the constituents of the urinary stones, so that preventive measures would be taken against recurrence.

Patients and methods: A total No. of 200 consecutive patients with upper urinary tract calculi, that were operated in the urology and general surgical wards of Sh. Zayed Hospital Rahim Yar Khan were included in the study. In addition to Rahim Yar Khan the patients also came from adjacent districts of Sindh and Baluchistan. Qualitative Chemical analysis was carried out using Merchnognost (Germany) urinary calculi analysis kit. All the tests were performed according to the instruction of manufacturers of the kit. **Results:** Stone samples were collected from 200 patients, out of these 138 (69%) were male and 62 (31%) of patients were female with male to female ratio 2.2:1 age range was between 9-72 years. Results of stone analysis indicate that calcium oxalate is the most common ingredient found in 100% of the stone samples. In 83% of patients it was found mixed with other varieties of stones while in 17% samples it was seen in pure form. Uric acid was the second most common ingredient seen in 73% of patients mixed with calcium oxalate and magnesium ammonium phosphate but it was not found as pure form. Magnesium Ammonium phosphate found in 13% of stones samples in mixed form only, not as isolated stone.

Key words: Urinary stones, chemical composition

Urolithiasis is one of the oldest disorders known to mankind and urinary stones man from at any level in the urinary tract but most of them are formed in the kidney. A 7000 years old stone has been found in an Egyptian Mummy¹. There are historical and geographical variations in the incidence of urinary calculi^{2,3}. In the recent years the incidence of urinary calculi has shown an increase in Pakistan⁴. The composition of urinary stones seems to be related to the level of economic development in a country because the composition of calculi is different in developed countries⁵. Management of urinary stones involves not only the removal of stones but also the Porphyllactic measures. Successful prophylaxis, however depends on the knowledge of the chemical composition of the stone removed⁶. Knowledge of the composition of urinary stones is important because urolithiasis is a recurrent disease in many people and preventive measures, must be based on such information⁷. The common methods used for stone analysis are chemical, optical and radiographic crystallography. Each method has its proponents as well as opponents. Chemical method is simple and has only 2% error in detection of composition of stones. These methods are best for practical use in the hospitals⁸.

Aims and Objects:

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Patients and Methods:

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Results:

Stone samples were collected from 200 patients, out of these 138 (69%) were male and 62 (31%) of patients were female with male to female ratio 2.2:1 age range was between 9-72 years. Results of stone analysis indicate that calcium oxalate is the most common ingredient found in 100% of the stone samples. In 83% of patients it was found mixed with other varieties of stones while in 17% samples it was seen in pure form. Uric acid was the second most common ingredient seen in 73% of patients mixed with calcium oxalate and magnesium ammonium phosphate but it was not found as pure form. Magnesium Ammonium phosphate found in 13% of stones samples in mixed form only, not as isolated stone. Cystine was seen in combination with other stone types in 3% of stone samples. Number and percentage of different stones is given in the following tables.

Table 1 Composition of Urinary Stones:

Chemical Composition	=n	%age
Calcium + OX + U.A.	138	69
Ca + OX	34	17
Ca + OX + UA + Mg + Po4	8	4
Ca + OX + Po4	6	3
Ca + OX + Mg	4	2
Ca + OX + Mg + Amm + Po4	4	2
Ca + OX + Amm + Po4 + Cysteine	4	2
Ca + OX + Cysteine	2	1

Table II: Frequency and Percentage of Chemicals:

Type of Stone	n=	%age
Calcium Oxalate	200	100%
Uric Acid	146	73%
Magnesium Ammonium phosphate	26	13%
Cysteine	6	3%

Discussion:

Urinary Calculogenesis is the result of multiple, complex and inter-related phenomena⁹. The chemical analysis of the stones guides about the identification of underlying metabolic disorders¹⁰.

Incidence of urinary stone disease is generally found to be higher in males than females. In our study male to female ratio is 2.2:1 which corresponds with many other studies. In a study of patients of Bahawalpur division by Abdul Rehman et¹¹, this ratio is 2.3:1. In another study of Rahim Yar Khan by Munawar¹², this ratio is 3.1:1 which is somewhat higher than our study. Males and females are equally affected in western countries.

As far as the composition in our study is concerned 83% of stones are of mixed variety while 17% are pure calcium oxalate stones.

Jehangir (1981) in Lahore¹³. Demonstrated 80% stones were of mixed variety and 17% pure calcium oxalate. These results correlate with our study.

In a study by Sial et al (1995)¹⁴ in D.G Khan Calcium oxalate was found in 100% of the stones analyzed. He found water in 60% of stones in mixed form and no pure uric acid stone was found. These findings also correlate with our study. In a study by Abdul Rehman et al (1996) in Bahawalpur, calcium oxalate mixed with urate is the most common type of stones 62% while pure calcium oxalate was 29%, Magnesium Ammonium Phosphate 5%, while in our study pure calcium oxalate was 17% which is lower than the above mentioned study and magnesium ammonium phosphate was lower than our study which was 13% Zafer et al¹⁵, in their study in Multan region revealed that maximum number of stones were mixed as calcium oxalate with urate. Study also revealed that 23.17% of specimens consisted of Calcium oxalate only. These results are similar to our study. One thing is astonishing in our study that cysteine is seen in 3% of stone samples mixed with calcium oxalate and ammonium phosphate. Prien and prien (1968) revealed 2.9% stones contain cysteine in mixed form but this is not found in other Pakistani Studies.

It is concluded from this study that calcium oxalate is the most common constituent of urinary stones mixed with urate, magnesium, ammonium, phosphate and rarely

cysteine. Uric acid is the next most common ingredient. Struvite stone is less common and found in combination with the more common chemicals.

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