

CHEMICAL NATURE OF VARIOUS TYPES OF RENAL STONES IN THE POPULATION OF DISTRICT MULTAN PAKISTAN

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ABSTRACT

Objective: Renal stones are widespread urological sickness in the whole world. Pakistan has possibly one of the uppermost occurrences of renal stone sickness. The main purpose of this study is to determine the chemical composition of renal stones in District Multan, Punjab, Pakistan.

Study design: Cohort study

Place & Duration of study: Different hospitals of District Multan, Punjab, Pakistan, June-2014 to June-2015 (one year)

Materials and Methods: The study included 340 subjects operated for renal stones. The stones were removed and send for analysis to laboratory. The stones were examined by using stone analysis kit (Merk) the various components of stones were resolute by titrimetric as well as colorimetric method.

Results: Renal stones were analyzed having different materials i.e. Pure Calcium oxalate stones were present in 136 patients, mixed stones of Uric acid and Calcium oxalate were present in 34 patients. There are also number of mixed stones were obtained having different concentrations. On the contrary, the present study is also compared with other studies conducted in different areas of Pakistan and other countries as well.

Conclusion: Renal stones problem is very much prevailing (especially pure calcium oxalate) in our population. Dietary habits and life style have major role to overcome in prevalence of kidney stone problems.

Keywords: Calcium Oxalate, Mixed stones, Chemical composition, Uric acid.

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INTRODUCTION

In a working-age population the urinary stone disease poses a vital health care load as it is a common disorder [1]. With multifactorial etiopathogenesis the renal stone is a commonest urological disorder [2]. Disturbance in the metabolism and excretion of stone elements is the major cause of popular stone diseases. In various parts of the world, the overall stones forming chances differ and reappearance rate of renal stones is about 75% in 20 years in span, 13% in North America 5-9% in Europe, and 1-5% in Asia is estimated [3]. In the United States, over the past 30 years the kidney stone occurrence increased. By 6% of women and 11.0% of men will have a symptomatic kidney stone by 70 years of age [4]. The kidney stones arise both in women and men but risk is high in men and more

common in women. Male to female ratio is 2:1 and in 2nd or 3rd decade of life peak of occurrence is detected [5].

The occurrence of stone disease at 6.3% in men and 4.1% in women is assessed in 1994 from the data published by the National Health and Nutrition Examination Survey (NHANES) [1]. Stones produce twice in men and once in women. Once a kidney stone formed, the chance of second stone formation is approximately 50% within five to seven years [6]. Mostly stones are idiopathic instead of that many inherited and systemic diseases are linked with calcium kidney stones. Prevention needs guess about systemic disease and modifiable factors [4].

This study is aimed to determine the prevalence of chemical composition of renal stones in District Multan Pakistan. On the other hand, the study also provides comparison of present work to other studies conducted in other areas of Pakistan as well as other countries.

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MATERIALS AND METHODS

An exposition cram is carried out to gather the information of stones analysis in 340 patients are operated of renal stone sickness over a time period of one-year June-2014 to June-2015 in different hospitals of District Multan, Pakistan. The data is collected in randomized way. These stones after removal were sent to the biochemical laboratory for chemical studies. In the laboratory, these stones are cleansed by means of the distilled water to get rid of the rubbish, dried entirely and weighed. Then these stones are trampled and liquefied as homogenous solution. Using stone analysis kit [7] (Merk) the various components of stones were resolute by titrimetric as well as colorimetric method.

RESULTS

Overall 340 patients in which male (70.59%) and female (29.41%) with age group 7-20 years (17.67%), 21-35 (70.59%) and 36 and above (11.74%) included in the present study (Table 1). The prevalence of renal stone chemical composition in Multan (Table 2) was Pure Calcium oxalate 40% that

is more common in our selected population, while, calcium oxalate + phosphate 30%, uric acid + calcium oxalate 10%, calcium oxalate + magnesium ammonium phosphate 7.94%, uric acid 5.88%, calcium oxalate + magnesium 4.11% and ammonia + magnesium + calcium oxalate 2.07%. Results of our present study then compared with prevalence of kidney stone chemical composition in other cities of Pakistan (Table 3) and other countries (Table 4) as well.

Table-1: Baseline characteristics of the patients (n=340).

	Frequency	Percentage (%)
Sex		
Male	240	70.59%
Female	100	29.41%
Total	340	100%
Age group		
7-20	60	17.67%
21-35	240	70.59%
36 & above	40	11.74%
Total	340	100%

Table-2: Frequency and (%) of stones with composition.

Chemical composition of renal stone	Frequency	Percentage
Pure Ca OX	136	40%
Ca OX+P	102	30%
UA+Ca OX	34	10%
Ca OX+MAP	27	7.94%
UA	20	5.88%

Ca OX+Mg	14	4.11%
Amm+Mg+Ca OX	7	2.07%
Total	340	100.0%

Calcium oxalate (Pure Ca OX), Calcium oxalate + Phosphate (Ca OX+ P), Uric acid + Calcium oxalate (UA+Ca OX), Calcium oxalate + Magnesium ammonium phosphate (Ca OX+ MAP), Uric acid (UA), 6: Calcium oxalate + Magnesium (Ca OX+ Mg), Ammonium + Magnesium + Calcium oxalate (Amm+Mg+Ca OX).

Table-3: Comparison of results of Chemical Composition of renal stones in Pakistan.

Chemical composition of renal stone	Present study n=340	Altaf et al [10] Nand Lal Kella n=100	Khan et al [2] Abbottabad n=70	Bangash et al [5] Islamabad n=232
Pure Ca OX	40%	27%	4.2%	38.4%
Ca OX+P	30%	5%	21.5%	15.9%
UA+Ca OX	10%	8%	-	31.9%
Ca OX+MAP	7.94%	5%	12.5%	2.5%
UA	5.88%	10%	51.4%	0.34%
Ca OX+Mg	4.11%	-	6.3%	0.43%
Amm+Mg+Ca OX	2.07%	-	6.3%	1.72%

Table-4: Comparison of present result with other countries.

Chemical composition of renal stone	Present study n=340	Hareendra et al [13] Sri Lanka n=50	da Silva et al [14] Brazil n=189	Jawalekar et al [15] Nepal n=95
Pure Ca OX	40%	43%	31%	57.75%
Ca OX + P	30%	2%	50%	12.8%
UA + Ca OX	10%	-	-	13.8%
Ca OX+MAP	7.94%	10%	34%	1.05%
UA	5.88%	0.85%	24%	17.9%
Ca OX + Mg	4.11%	-	50%	1.05%
Amm + Mg + Ca OX	2.07%	2%	-	1.05%

DISCUSSION

Among all kidney diseases, kidney stone is the major cause of morbidity [8]. It is a very common disease of surgical and urological departments in Pakistan [9]. There are many causes of stone formation but some most common factors are environ-mental factors i.e. pollution, global warming etc. and dietary factors i.e. vegetables [3] and cereals [5]. Insufficient water intake is another cause of renal stone besides the dietary factors. Meat is the major source of over acidification of stones which cause the

increased excretion of oxalate, calcium and uric acid, whereas decreases the citrate excretion as citrate provides protection against formation of stones. So, if we use excess meat in our diet, then kidney stone problems also increase. Collectively acidic urine is the main factor for uric acid stone formation [5].

The previous studies from different areas of Pakistan [2, 5, 9-12] revealed that pure calcium oxalate stone is more common than all other types of stones. Such relevance is also found in present study (Table-2). Bangash et al [5] observed that kidney

stone risk is high in men and more common in young women. Male to female ratio is 2:1 and peak incidence is observed in 2nd or 3rd decade of life. The present study also shows that the ratio of stone formation is greater in males (70.59%) than females (29.41%) (Table-1).

The results of present study reveal (Table-2, 3 & 4) that pure uric acid calculus (5.88%) is less common than pure calcium oxalate stone (40%) in district Multan, whereas, percentile of pure uric acid calculus were found different in other regions of Pakistan i.e. Nand Lal Kella (10%), Abbottabad (5.14%) and Islamabad (0.34%) and other countries i.e. Sri Lanka (0.85%), Nepal (17.9%) and Brazil (24%). The percentile difference in the occurrence of pure uric acid kidney stone may be due to low/high intake of protein diet. While, present result also shows that occurrence of other mixed nature of kidney stones are comparable to other studies conducted in different parts of Pakistan and other countries as well (Table-2, 3 & 4).

CONCLUSION

In conclusion, renal diseases are very much common in different regions of Pakistan and other countries as well. Majority of stones are of mixed nature and the dominant component of all stones is calcium oxalate. The prevalence of kidney stones is more common in areas of hot climate and insufficient of drinking water. On the other hand some dietary habits and life style are also played a critical role in prevalence of kidney stone problems.

AUTHORS CONTRIBUTION

Noreen Samad: Concept and overall supervision, manuscript writing.

Sana Liaqat: Data collection, tabulation.

Mamoona Anwar: Data collection, literature review.

Kanza Tehreem: Data collection.

Hafiza Maniha Sadiq: Data collection, literature review.

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