CHEMICAL STUDY OF URINARY CALCULI

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ABSTRACT

Of the 120 stones analysed, 54 were renal in origin, 52 were bladder stones, 2 were ureteric stones while 12 were spontaneously passed.92% (111) stones contained calcium oxalate as the main component. Of these 922%, 58.3% (70) stones were pure calcium oxalate. The male to female ratio was approximately 6:1. Peak presentation was in the 15-45 years' age group.

INTRODUCTION

Pakistan falls in the stone belt area. Here the incidence of calculus disease is probably the highest in the world. The composition of stone may differ in various areas depending upon the diet, climate and other factors.[2] Knowledge about the composition of stones, obtained after their chemical analysis, is often the key to specific treatment. "[4] In this article we present the results of chemical analysis of urinary tract stones collected from the urology unit, D.H.Q. Hospital, Abbottabad.

The stones were repeatedly washed with distilled water to clean them of blood and cellular debris and allowed to dry' at room temperature. The samples were powdered with a pestle and mortar. The chemical analysis was carried out by the kits of Merko-test (Kerk-diagnostica cat. No. 11003) based on Maurer and Gotz.[5] The approximate compositions were calculated by using the manufacture's calculation aid.

RESULTS

During the period of study stones from 120 patients were analysed A single stone from each patient was taken as a sample. There were 100 patient's male and 20 females. The distribution of stones and sex frequency are shown in Table I.

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TABLE-1: LOCATION OF STONES AND SEX INCIDENCE.

Location	Male	Female	Total
Kidney	44	10	54
Ureteric	02	-	2
Vesical	44	8	52
Passed in urine	10	2	12
Total	1100	20	120

As regards age, the peak presentation in both sexes was in 16-45 years' age group. As far as location of the calculi was concerned, the upper tract stones were most common between 16-45 years and lower tract stones between 0-15 years and also above 45 years of age. The urinary calculi were most frequently observed in 16-30 years' age group. The distribution of stones according to age is shown in table II.

TABLE II DISTRIBUTION OF STONES ACCORDING TO AGE

Age Group (Years)	Upper tract		Total	Percentage
0-15	6	16	22	18.33
16-30	36	10	46	38,33
31-45	16	10	26	21.67
above 45	10	16	26	21.67

Chemical composition is shown in table III. A total of 92% (111) stones contained calcium oxalate in pure or mixed form. Pure calcium oxalate stones comprised 58.3% (70) of the total number, while the mixed ones constituted 34% (41) stones.

TABLE Ill RESULTS OF CHEMICAL ANALYSIS OF STONES

Type	Total No.	%age	Male %age	Female %age
Pure calcium oxalate.	70	58.3	49.0	9.0
Calciumu oxalate + apatite.	20	16.6	12.0	5.0
Calciumu oxalate +Uric Acid.	10	8.3	7.3	3.7
Calciumu oxalate +Brushite.	8	6.6	5.2	1.8
Calcium oxalate -t-Struvite.	2	1.6	.5	.5
Calcium oxalate +Cystine.	1	.8	.5	-
Pure Uric Acid.	2	1.6	1.5	.5
Pure Struvite.	2	1.6	1.5	-
Struvite +Apatite.	2	1.6	1.0	-
Struvite +Uric Acid.	1	.8	-	.5
Pure Ammonium urate.	1	.8	.5	-
Pure Cystine.	1	.8	.5	-
Total	120	100	79	21.0

Apatite = Tricalcium phosphate. Brushite=Calcium Hydrogen phosphate.
Struvite=Magnesium Ammonium phosphate.

DISCUSSION

Urolithiasis is a world wise disorder. The most common component of urinary calculi all over the world is calcium oxalate.[2,9] Many studies have been done in Pakistan. Jennat and Rahim 1970, Rizvi 1975, Khan et al, 1986 and Rab et al, 1990 in their reports also found pine calcium oxalate stones as the commonest type.[7,8,10,11]

In our stud>\ calcium oxalate both in pure and mixed form comprised of 92% of the cases. In pure form it exceeded more than half (58.3%) of the total number. Calcareous stones make up more than 80% of the renal calculi.[12] The frequency of calcium, phosphate and oxalate, magnesium ammonium and urate is similar to that reported by Rao et al,[13] Das Revicllland et al,[14] Rab et al,[11] and Khan et al.[10]

Stones containing uric acid are less frequent (10.7%) in our study. Pure uric acid stones were only 2(1.6%). In our area the scarcity of this entity may be either real or a further study on a larger scale may clarify the position. However, uric acid in combination with calcium oxalate presented as the third major group with 10(8.3%) of the total cases. Cystine component mixed with calcium oxalate was an unusual finding.

High occurrence of calcium oxalare stones have been reported from Thailand where food rich in oxalate is consumed.[15] The diet of the inhabitants of this area is far from ideal and is generally of a vegetarian nature (rich in calcium and oxalate contents). This fact suggests that diet could be one of the causative factors in the formation of urinary tract calculi.

Patients with renal stones in our study also gave a history' of high consumption of rice in their daily food besides milk and its products. High calcium content in these food products may probably be one of the lithogenic factor.

Our results show peak presentation of 16-45 years. These individuals at the prime of their active outdoor work loose more water in sweating Our people consume usually less fluid, leading to low urine volume, especially in the hot dry climate. Consequently, super saturation of mine with solutes results in a situation with a high risk of urolithiasis.

Urolithiasis is a heterogeneous disorder of multiple etiologies and perhaps a nutritional factor is responsible in stone formation. This article presents a preliminary' report in this context. Further research in this direction would definitely give us some more informative and positive results.

ACKNOWLE DGEMJENT

The authors gratefully acknowledge the assistance and co-operation of laboratory' staff of D.H.Q.

Hospital Abbottabad and Mr. Mohammad Iqbal, Stenographer, PMRC for typing the manuscript.

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