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RENAL STONE: PREVALENCE OF VARIOUS TYPES OF RENAL STONES RELATED TO AGE & GENDER

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Abstract:

Objective: *To find out prevalence of renal stones with different chemical composition related to gender and different age groups.*

Study design & duration: *This is a prospective study completed in duration of six months from July to August.*

Setting: *This study was conducted in urology ward of ……*

Patients & methods: *Using randomized controlled trials those patients with renal stones admitted in study institution were selected for study irrespective of age, gender and geographical area from where they belong. Age range of patients in study group was 10-75 years with mean age of 33.6±7.5 years. Renal stones were collected from these cases and sent for chemical examination. Means, standard deviation and frequencies were calculated for qualitative data like age, gender and type of stone.*

Results: *Total 1100 cases were studied including 64.8% male and 35.2% female cases. Prevalence of renal stone was higher among men than women wih male to female ratio of 1.8:1. Prevalence was higher in age group of 20-50 years among men and 30-40 years among women. Pure stones were found in 66.5% cases with calciu oxalate stones were most common (26.6%) and mixed stones were found in 33.5% cases with calcium oxalate- calcium phosphate stones more common (13.2%) among them.*

Conclusion: *Calcium oxalate stones are most common among all types of renal stones with high prevalence among men than women in middle age groups.*

Key words: *Renal stone, Renal calculi, Prdominant renal stone, age and gender related prevalence*

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INTRODUCTION:

Nephrolothiasis is a chronic disease with increasing prevalence all over the world and mostly common in industrialized, developed countries. It is associated with physical inactivity, hot climate, overweight, animal protein, less intake of fluids, systemic diseases and animal proteins. Its life time risk is 1-5% in Asian countries, 10-15% in USA and 5-9% in Europe.[1]Renal stone is a disease of ancient times. Hypothesis of Avicenna stated that excessive matter in urine causes stone of urinary bladder.[2] After UTI and prostate disease, renal renal stone is the third most common problem urinary tract accounting 10% population of the world.[3]There is 6-12% risk of developing renal stone once in life time.[4] Kidney stone also called renal calculi, is a crystalline material formed in the kidney or urinary tract which may increase in size and impair renal functions. Decreased fluid volume or increased mineral concentration can cause formation of renal stone. Urinary stone contains urinary salts, bacteria, degenerated tissue, blood clots and sloughed epithelial tissue. Renal stone causes hematuria, groin, flank or abdominal pain. Stone in kidney, ureter and urinary bladder is termed as nephrolithiasis, ureterolithiasis and vesicolithiasis.[5] Patients with renal calculi can present with nausea, vomiting, flank pain, fever, incomplete voiding, oligurea or burning micturation. Its prevalence is related to age, gender and geographical area. Renal stones are formed of metabolic end products like urate, oxalate and phosphate. Renal stone of 5mm is treated conservatively while size more than 5 mm is treated surgically.[6] Urinary tract stone is much common in USA and costs about 10 billion annually. Its prevalence has become doubled in last 15 years just like diabetes mellitus and obesity.[7] Prevalence of renal stone disease is very high in few countries also callee stone belts like Pakistan, India, Egypt, Sudan, Burma, Indonesia and Thailand.[8]Western diet is associated with obesity, increased BMI and hence increased rate of renal stones formation. More consumption of fats, sugar, animal proteins and decreased intake of fluid, fiber diet is associated with high risk of stone formation. More use of sodium and fructose is also related to stone formation. Low estrogen level as in postmenopausal women is also a risk factor of kidney stone.[9] Its prevalence is more in 30-60years of age with high recurrence rate. It is more common in men than women. Diet plays important role in development of renal stone.Proper composition of stone should be known for prevention and treatment.[10] Knowing chemical nature of stone we can understand its pathophysiology, hence we can advise our patients proper preventive measures to reduce its incidence in our region.This study was done to determine relation of various types of stones with age and gender.

PATIENTS AND METHODS:

This is a prospective study started in July 2019 and completed in December 2019 consisted on 6 months of duration. Patients for study group were selected using randomized controlled trials. P-value less than 0.05 was taken significant and more than this non-significant. Confidence interval was 95% with 5% margin of error. A predesigned performa was used to document data of patients like age, gender, residency, duration of symptoms and type of stone. Mean age of patients was 33.6±7.5 years. Patients of either gender and of all age groups were included in the study irrespective of the city where they belong. Diagnosis of renal stone was made using x-ray KUB, ultrasonography, IVU and in some cases CT KUB was done as well. Diagnosis was also confirmed in those who passed stone spontaneously or after any intervention. Kidney stones were taken in a plastic bottle with a label mentioning name and registration number of patient and sent for chemical examination to the hospital lab. Before examination stones were washed with tap water to remove any debris, blood or contamination. Stones were broken into small pieces and grinded then chemical examination was done using Merckognost reagent kit. Stones were dissolved in a chemical solution and then its various componenets were detected. Consent was taken from all patients for including them in this study. Permission was taken from ethical committee if the study institution as well. Data was analyzed using Microsoft Office and SPSS version 20. Results were presented in tabular and graphical form.

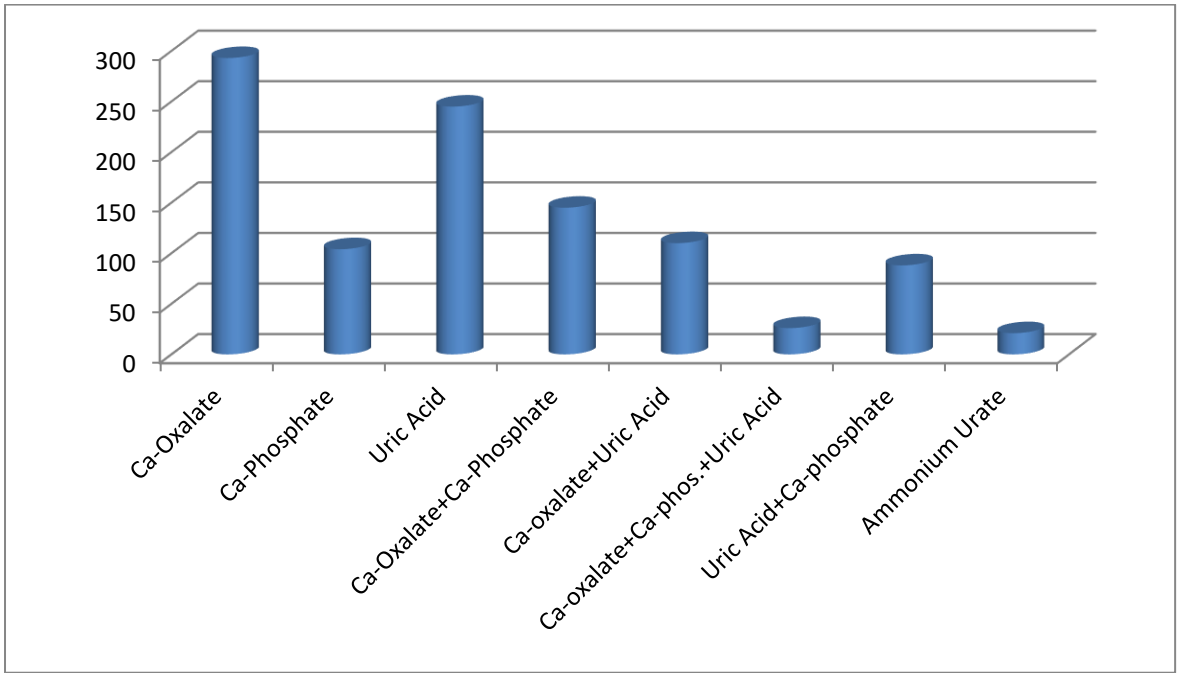
RESULTS:

Eleven hundred cases were studied in which 713(64.8%) were male and 387(35.2%) were female patients. Range of ages of patients in study group was 10-75 years with mean age of 33.6±7.5 years. There were 80(7.3%) cases between 10-20 years age, 148(13.5%) were between 21-30 years, 375(34.1%) cases were between 31-40 years, 289(26.3%) were between 41-50 years, 110(10%) were between 51-60 years and 98(8.9%) cases were above 60 years of age. Prevalence was higher in age group of 20-50 years among men and 30-40 years among women (Table-1).

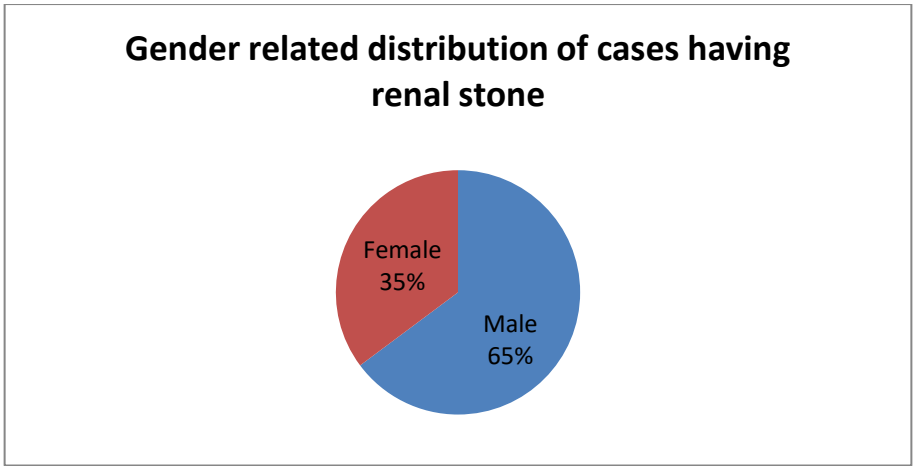
(Table-1) Age distribution of renal stone among study cases (n=1100)

Age intervals (years)	Total cases	Male cases	Female cases	Ratio	P-value
10-20	80 (7.3%)	53 (4.8%)	27 (2.4%)	1.9:1	0.001
21-30	148 (13.4)	85 (7.7%)	63 (5.7%)	1.3:1	
31-40	375 (34.1%)	225 (20.4%)	150 (13.6%)	1.5:1	
41-50	289 (26.3%)	209 (19%)	80 (7.3%)	2.6:1	
51-60	110 (10%)	76 (6.9%)	34 (3.1%)	2.2:1	
>60	98 (8.9%)	65 (5.9%)	33 (3%)	2:1	
Total	**1100**	**713 (64.8%)**	**387 (35.2%)**		

Out of total 1100 cases in study group, pure stones were found in 731(66.5%) and mixed stones were found in 369(33.5%) cases. In pure stones, calcium-oxalate was predominant stone found in 293(26.6%) and calcium phosphate in 104(9.5%), uric acid in 245(22.3%) and ammonium urate was found in 21(1.9%) cases. In mixed stones calcium oxalate + calcium phosphate stones were found in 145(13.2%), calcium oxalate+ uric acid stones in 110(10%), calcium oxalate+ calcium phosphate+uric acid stones were found in 26(2.3%) and uric acid+ calcium phosphate stones were found in 88(8%) cases (figure-1).Mostly male were having renal stone disease (65%) (figure-2).



(Figure-1) Frequency of various types of renal stones among cases in study group



(Figure-2) Prevalence of renal stones according to gender

DISCUSSION

Renal stone is a third most common disease of urinary tract. It is the most common urological disease in Pakistan.[11] In this study prevalencwe of renal stone disease was determined related to age and gender among pakistani people living in different cities which presented to the study institution. Regarding relation to the age a study was conducted previously in Pakistan reported that renal stone was mostly found in 13-50 years of age among the people of Multan which were operated for renal stone disease.[12] Another study done by Ahmed concluded that prevalence of this disease is common in the age group of 30-50 years.[13] In our study average age was 33.6±7.5 years. Prevalence was higher in age group of 20-50 years among men and 30-40 years among women with male to female ratio of 1.8:1. Accordinhg to results of A study conducted in Sindh Institute of Urology and Renal Transplantation (SIUT) renal calculi were most common among total cases with urinary tract stones with male predominance (64.8%) in age interval of 18-90 years and mean age of 42.7 years. In their study gender difference was noted regarding renal stones only but there was no significant gender difference regarding prevalence of stones in overall urinary tract system.[14] Previous study done by Shafiq et al. regarding age and gender related prevalence of renal stones in Punjab pakistan stated prevalence of renal calculi higher among males than females with ratio of 2.8:1, most common stones were calcium oxalate in 32% and uric acid stones were found in 21% cases.[15] These results are similar to our study in which male predominance was found with prevalence of calcium oxzalate stones were 26.6% and uric acid stones were 22.3%. A study done by Rasool et al reported male to female ratio of 3:1 for urinary tract stones in Bahawalpur, a city of south Punjab.[16] Another study done in Multan, Pakistan by Rafique et al on chemical nature of urinary tract stones reported male to female ratio of 3:1.[17] These results are comparable to our results. High prevalence of renal stones among male population can be due to stone forming effect of sex hormones. Androgens cause deposition of oxalate and enhancing calcium oxalate formation in kidney while estrogen decreases excretion of oxalate.[18] There may be another reason of increased prevalence of renal stones among males due to increased muscle mass in comparison to females so more metabolic waste production and excretion from kidney increasing chances of stone formation. In men urinary tract is more complicated than women so that may be another reason of increased prevalence in men.[19] In our study second most common renal stones were uric acid stones. Pure urci acid stones were found in 22.3% and mixed uric acid stones were in 20.3% cases. In different previous studies prevalence of uric acid stones was reported as 40.8%, 43.3% and 60%. A study conducted in karachi, Pakistan reported 52.8% prevalence of uric acid stones.[21,22]

CONCLUSION:

Renal stones are a very common urological disease in Pakistan. It is more common in men than women. Calcium oxalate stones have highest prevalence followed by uric acid stones as 2nd most common renal stones. Renal stones usually occur in age interval of 20-50 years having low prevalence in young and old age people. Stones with pure chemical com[position are more common than mixed composition stones in our country.

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