

Urinary Stones, Renal Cysts and Renal Impairment in Patients with Gout

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ABSTRACT

Introduction: Urinary stones, renal cysts and renal failure are reported complications of gout. This study aimed to elucidate prevalence and relationship among them in gout patients.

Material and Methods: In this prospective study, 107 patients with gout were included. Clinical assessment, BMI, comorbidities, dietary habits, urine microscopy, serum uric acid and renal functions were noted in all patients. Ultrasonography was used to detect urinary stones, renal cysts or any other abnormality in urinary system. Data was analysed using unpaired t test and Chi-square test. P value of <0.05 was considered statistically significant.

Results: In gout patients urinary stones, renal cysts and impaired renal function were seen in 24.2% (26/107), 19.6% (21/107) and 28% (30/7) cases respectively. Serum uric acid level was significantly higher in those with impaired renal function. Occurrence of urinary stones was related to serum uric acid levels and duration of gout ($p=0.038$ and $p<0.0001$). There was no association between renal stones and renal cysts ($p=0.153$). Presence of renal stones and duration of gout were associated with impaired renal function in gout patients ($p=0.0011$ and $p=0.0006$).

Conclusions: Urinary stones and renal impairment are significant health problems in gout patients. Urinary stones and long standing disease are associated with renal impairment in gout.

Keywords: Urinary Stones, Renal Cysts, Renal Impairment

INTRODUCTION

Gout is a metabolic disease caused by an inflammatory response to monosodium urate crystals, which may occur in people with hyperuricemia^{1,2}. Urinary stones, renal cysts and renal failure have been reported in gout patients with higher prevalence as compared to normal population^{3,4}. However, data on their complex relationship in gout patients is sparse in published literature. In the general population, prevalence of renal cyst on ultrasonography varies from 4.2 to 41%⁵⁻⁸. The occurrence of simple renal cyst has been related to male gender and aging⁷⁻⁹, with increased prevalence in elderly, in whom it may reach 50%¹⁰. An association of the presence of renal cyst with hypertension and decrease in renal function has been reported¹¹⁻¹³. This study aimed to elucidate prevalence of urinary stones, renal cysts and renal failure and relationship among them in Indian gout patients.

MATERIAL AND METHODS

In this prospective study conducted between August 2014 and January 2018 at a tertiary care institution, 107 patients with gout were included after institutional ethics committee

approval for the study. Outdoor and indoor patients who fulfil the American College of Rheumatology (ACR) classification criteria for gout were included in the study¹⁴. Written informed consent of subjects was taken prior to participation in the study. Detailed clinical history and examination, dietary habits, body mass index (BMI), comorbidities (Diabetes, hypertension, coronary artery disease, dyslipidaemia etc.), urine microscopy, serum uric acid and serum creatinine were noted in all patients. Ultrasonography (using 3.5 – 5.0 hertz probes) was done to detect urinary stones, renal cysts or any other abnormality in urinary system. Patients with polycystic kidney disease were not included in the study. Ultrasonographic criteria for the diagnosis of a simple renal cyst included spherical or ovoid cyst, presence of a thin and smooth wall, absence of internal echoes and enhancement of the posterior wall, indicating ultrasound transmission through the water-filled cyst¹⁵. EGFR was estimated using modification of diet in renal disease study (MDRD) equation and $eGFR < 60$ ml/ min/1.73 m² body surface area was considered as renal impairment. Data was analysed to find the prevalence of urinary stones, renal cysts and renal impairment and their relationship in patients with gout.

STATISTICAL ANALYSIS

The results are presented in mean±SD and percentages. The dichotomous/categorical variables were compared by Chi-square test/fisher exact test. The continuous variables were compared by unpaired t-test. The P value < 0.05 was considered significant. All of the analyses were carried out by using SPSS 16.0 version (SPSS Inc., Chicago, IL, USA).

RESULTS

Table 1 shows the patient demography and parameters in gout patients. Mean age, body mass index (BMI) and male/female ratio were 49.2±5.4, 26±5.4 and 97/10 (90.7%/9.3%). 57% patients of gout had co-morbidities (dyslipidemia, hypertension, diabetes mellitus and coronary artery disease

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| Parameter | Value |
|--|-------------------|
| Age(mean±SD) in years | 49.2±13.3 |
| Male/Female ratio (No.) | 97/10(90.7%/9.3%) |
| Body mass index(mean±SD) kg/m ² | 26±5.4 |
| Co-morbidities (No.) | 61(57%) |
| Diabetes | 19(17.8%) |
| Hypertension | 31(28.9%) |
| Coronary artery disease | 10(9.3%) |
| Dyslipidemia | 55(51.4%) |
| Duration of gout(mean±SD) in years | 0.3-35±9.0 |
| eGFR (mean±SD)(ml/ min/1.73 m ²) | 71.6±27.9 |
| Serum uric acid (mean±SD)(mg/dl) | 9.7±1.7 |
| Serum creatinine (mean±SD)(mg/dl) | 1.3±0.54 |
| Impaired renal function(eGFR <60 ml/ min/1.73 m ²) (No.) | 30/107(28%) |
| Renal stones (No.) | 26/107(24.2%) |
| Renal cysts (No.) | 21/107(19.6%) |

Table-1: Demography and parameters in gout patients (n=107)

in 51.4%, 28.9%, 17.8% and 9.3% respectively). Urinary stones, renal cysts and impaired renal function (eGFR <60 ml/min/1.73 m² body surface area) were seen in 24.2% (26/107), 19.6% (21/107) and 28% (30/107) patients respectively. Renal stones alone, renal cysts alone and both cyst + stones were seen in 18/107(16.8%), 13/107(12.1%) and 8/107(7.4%) cases. Presence of renal cysts was not associated with presence of renal stones (p=0.153). Serum uric acid level was significantly higher in patients with impaired renal function as compared to those without impaired renal function (10.78±1.67 vs. 9.3±1.65, P<0.0001). Occurrence of urinary stones was related to serum uric acid levels and duration of gout (10.38±0.72 vs. 9.56±1.94, p=0.038 and 17.6±10.76 vs. 7.0±7.01, p<0.0001). Prevalence of renal stones and duration of gout were significantly higher in patients with impaired renal function as compared to those without renal function impairment (50% vs. 12.5%, p=0.0011 and 14.3±6.05 vs. 7.68±9.44, p=0.0006 respectively).

DISCUSSION

We found 24.2% prevalence of renal lithiasis in gout in this study. Higher prevalence of renal stones in gout as reported by many studies in literature^{16,17} may be related to higher serum uric acid concentration, amount of uric acid excretion and urinary acidification^{18,19}. In our study we did not find any association between occurrence of renal cyst and renal lithiasis although some studies in literature^{5,20,21} report a variable negative or positive correlation between renal cysts and renal lithiasis. Higher serum uric acid levels in patients with renal stones and renal impairment in our study suggest the need of uric acid control and monitoring especially in those with long standing gout disease. Recently, Kim et al²² also found increased risk of developing a new stone with increasing level of serum uric acid concentration among men with asymptomatic hyperuricemia. Although urinary uric acid concentration does not seem to be a risk factor for stone²³, allopurinol reduces calcium oxalate stone recurrence among patients with isolated hyperuricosuria²⁴. Limitations of our study are 1) we did not measure urinary pH and urinary

citrate, which may also variably affect renal stone formation and 2) limited number of patients in our study. In spite of unexplained and variable causes of different types of stones formation in gout, stricter control of serum uric acid level might reduce stone formation in addition to preventing renal impairment in these patients. Larger studies with assessment of more risk factors may be required to further address these complex issues in gout patients.

CONCLUSION

Urinary stones and renal impairment are significant health problems in gout patients. Urinary stones and long standing disease are associated with renal impairment in gout.

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