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MP03-06 ASSOCIATION OF URINARY STONE DISEASE WITH KIDNEY FUNCTION DECLINE

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Publication Date

2020-04-01

DOI

10.1097/ju.0000000000000817.06

Peer reviewed

<15.0 μU/mL; 2) "Moderate IR" group: HOMA-IR ≥2.5 and insulin <15.0 μU/mL; and 3) "Severe IR" group: HOMA-IR ≥2.5 and insulin ≥15.0 μU/mL. None of the participants had low HOMA-IR and high insulin level. Demographic variables and physical activities including walk and sedentary times were compared among the three groups. Logistic regression analysis was used to estimate the odds ratio (OR) and 95% confidence interval (CI) for incident kidney stones at 5 years after baseline.

RESULTS: A total of 97 men (4.7%) and 45 women (2.3%) developed kidney stones at 5 years after baseline. At baseline, 1,878 men and 1,812 women were classified into the Control group, 158 men and 91 women into the Moderate IR group, and 48 men and 20 women into the Severe IR group. Body mass index, abdominal circumference, blood pressure, and triglycerides were significantly higher and high-density lipoprotein cholesterol was significantly lower, in the order corresponding to the Control, Moderate IR, and Severe IR groups. After adjustment for multiple variables, the Severe IR group was associated with kidney stone formation (OR, 2.91; 95% CI, 1.02–8.25) in men. Meanwhile, there was no difference between IR and kidney stone formation in women. Sedentary lifestyle was associated with IR.

CONCLUSIONS: In Japanese men, severe insulin resistance was associated with kidney stone formation under normoglycemic conditions. Avoiding sedentary lifestyles could prevent kidney stone formation through improving insulin resistance.

Source of Funding: none

MP03-05

URINARY CITRATE WASTING AMONG NEPHROLITHIASIS PATIENTS ASSOCIATES WITH OBESITY AND DIABETES MELLITUS

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INTRODUCTION AND OBJECTIVE: Urinary citrate is thought to decrease calcium stone formation through direct inhibition of crystallization and by complexing with calcium. A subset of nephrolithiasis patients excrete very high amounts of citrate with unclear clinical implications. Here we sought to profile nephrolithiasis patients with urinary citrate wasting.

METHODS: We identified 2,257 consecutive patients who underwent 24-hour urine studies performed at our institution from 2001 to 2017. We identified patients with 1st time urine testing with citrate wasting, defined as >1500 mg/day. Patients were excluded if on any alkali therapy. After applying these selection criteria, a total of 55 citrate wasters were identified and randomly matched 1:3 by age and sex to other stone formers for a final comparative cohort of n = 165. Univariate analyses with chi-square and t-tests were used to assess differences in demographic, clinical, stone and 24-hour urine characteristics.

RESULTS: Citrate wasters had significantly higher mean ± SD BMI (35.0 ± 7.3 vs 29.9 ± 7.9 kg/m², p < 0.001) and a higher prevalence of diabetics (61.8 vs 20.6%, p < 0.001). Calcium oxalate monohydrate (COM) and uric acid stones were the two most common stones the citrate wasting group (70% and 15% respectively), while COM and hydroxyapatite stones were most common in the control group (58% and 20% respectively). Uric acid stones were more commonly observed among citrate wasters (15% vs 7%, p = 0.096). On 24-hour urine analysis, the citrate wasting group showed higher urine values of calcium, oxalate, uric acid, and sodium (all p<0.001; see Figure). Notably, urine pH showed no difference between groups. These results were largely unchanged when examining differences by sex.

CONCLUSIONS: Nephrolithiasis patients who excrete > 1500mg of urinary citrate per day are more likely to be obese and diabetic, with generally worse urinary analytes overall relating to stone recurrence risk. Further investigation is needed on the etiologic and clinical implications of these findings.

Table 1. Comparison of 24-hour urine characteristics between citrate wasters and controls

	Control (n = 165)		Citrate waster (n = 55)		p-value
	Mean	SD	Mean	SD	
BMI	29.9	7.9	35	7.3	<0.001
Volume	2	0.9	2.6	0.9	<0.001
SSCaOx	6.7	3.3	8.4	3.4	0.002
Ca24	230.2	126	413	197.3	<0.001
Ox24	39	16.6	52.8	15.6	<0.001
Cit24	631.3	345.5	1868.1	366	<0.001
SSCaP	1.3	1	1.7	1.3	0.013
pH	6.1	0.5	6.1	0.6	0.992
SSUA	0.9	0.8	1	0.8	0.406
UA24	0.7	0.2	1	0.3	<0.001
Na24	183.6	77.8	281.4	113.4	<0.001
K24	61.8	24.8	86.7	23.7	<0.001
Mg	103.8	46	149.1	56.7	<0.001
P	1	0.4	1.4	0.5	<0.001
Nh4	37	15.4	43.7	17.8	0.008
Cl	176.5	72.7	264.4	111.5	<0.001
Sul	40.5	16.8	53	20.4	<0.001
UUN	11.2	3.9	15.2	5	<0.001
PCR	0.8	0.2	0.9	0.2	0.044
Cr24	1470.9	436.8	1988.7	691.9	<0.001
Cr24kg	16.6	4.1	18	4.8	0.045
Ca24	2.6	1.5	3.9	2.1	<0.001

Source of Funding: None

MP03-06

ASSOCIATION OF URINARY STONE DISEASE WITH KIDNEY FUNCTION DECLINE

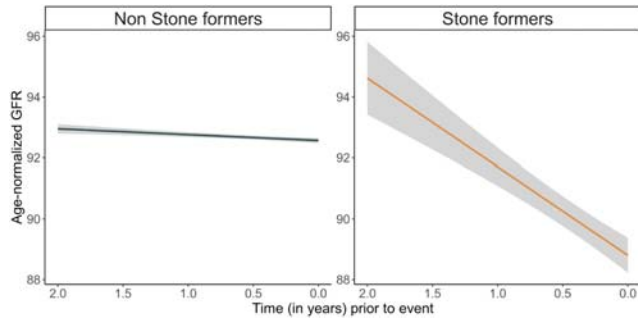
Sudarshan Srirangapatnam, David Bayne, Justin Ahn, San Francisco, CA; Scott Wiener, Syracuse, NY; Tom Chi, Sunita Ho, Raymond Hsu, Marshall Stoller, San Francisco, CA*

INTRODUCTION AND OBJECTIVE: Prior studies have shown significant differences in glomerular filtration rate (GFR) between stone formers and non-stone formers. There is evidence that nephrolithiasis is a risk factor for chronic kidney disease (CKD). The role of kidney function in kidney stone formation however largely remains unexplored. The objective of this study is to investigate differences in kidney function decline between stone formers and non-stone formers over time.

METHODS: A retrospective study was undertaken using de-identified patient data at our tertiary care center. Serum creatinine values of adults (age ≥ 18) were used to calculate GFR using the CKD-EPI creatinine equation. The primary outcome was change in GFR per year using an adjusted linear model. An adjusted cox-model was used to calculate the average risk of stone formation associated with GFR decline in stone formers based on date of initial nephrolithiasis diagnosis. Our secondary outcome was GFR change post stone formation stratified by surgical versus non-surgical intervention.

RESULTS: Complete data for analysis was obtained from 3,450 stone formers and 112,072 non-stone formers after review of medical record data between 2010 and 2019. Stone formers had an overall GFR decline of 2.8 cc/min per year (p-value < 0.001) compared to a decline of 0.04 cc/min per year (p-value = 0.38) in non-stone forming patients. A fully adjusted cox-model indicated, on average, each 1 cc/min decline in GFR was associated with an increased risk of stone development in the following 2 years by 3.7%. Stone formers who underwent surgical intervention (PNL, URS, or SWL) had stable GFR post-operatively at 1 year. Patients who did not undergo surgical intervention had GFR decline of 0.82 cc/min CI [-1.56, -0.08] at 1 year (p-value = 0.03).

CONCLUSIONS: A decline in GFR is associated with risk of kidney stone presentation up to 2 years prior to a stone event. This suggests that upstream changes in the renal papilla which affect GFR also may be contributing to mineralization. Kidney function decline could be used as a possible predictive tool for risk of stone formation. Additionally, surgical intervention is associated with preservation of GFR within one year after stone event. Clinically, unexplained GFR decline should increase suspicion for nephrolithiasis and appropriate evaluation and treatment should be considered.



Source of Funding: none

**MP03-07
URINARY STONE COMPOSITION IN THE UNITED STATES: DATA OF 98,043 URINARY STONE ANALYSES**

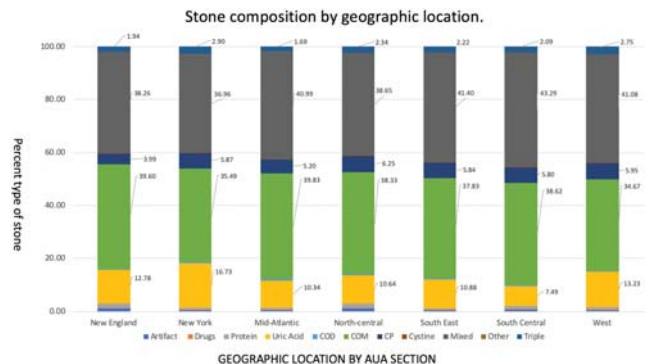
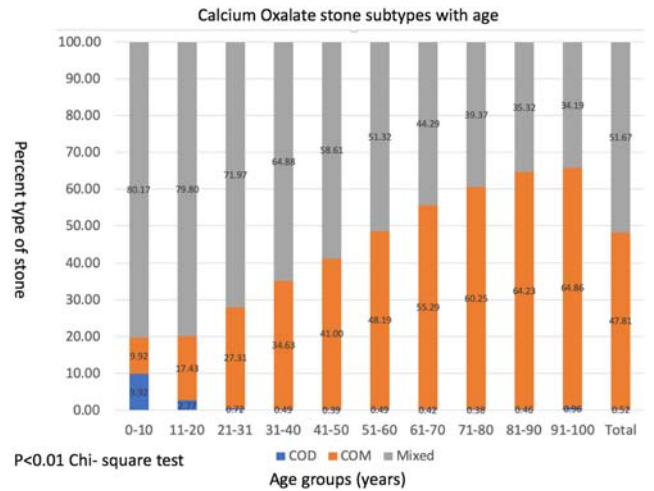
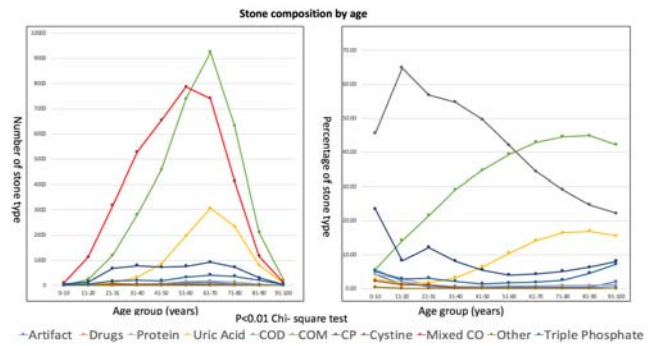
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INTRODUCTION AND OBJECTIVE: There is a paucity of large-scale data on urinary stone composition in the United States. Here, we present characteristics of urinary stone composition, age and geographic region in the United States.

METHODS: We obtained compositional analyses for all urinary stones submitted to a reference laboratory from July 15, 2016 to Sept. 29, 2019. Stone composition was determined by integrative crystallography. Stones containing >90 percent of particular chemicals were classified as purely made of that composition. Data was analyzed using Stata 16 (College Station, Texas) software.

RESULTS: Total of 99,908 records of stones were analyzed. Of this 98,043 were categorized as urinary stones and remaining were non-crystalline physiological particulate matter or artifacts. Common stone types were calcium oxalate (79.33%), uric acid (10.63%), calcium phosphate (5.73%) and triple phosphate (2.22%). Rare variety of stones included predominantly protein (0.93%), cystine (0.26 %) and drug induced (0.22%). Incidence of calcium oxalate and uric acid stones increased with age and that of calcium phosphate decreased with age. Amongst patient with calcium oxalate stone, incidence of calcium oxalate monohydrate increased with age and that of mixed calcium oxalate stones and calcium oxalate dihydrate decreases with age (p<0.01) (figure 1 and 2). Although the incidence of common stone types was similar, overall association between stone composition and geographical distribution was found to be statistically significant (figure 3).

CONCLUSIONS: This series is the largest analysis to date of urinary stone composition in the United States. Age and geographical region were significantly associated with variations in stone composition.



Source of Funding: NIL

**MP03-08
ASSOCIATION OF PRIOR PREGNANCY WITH 24-HOUR URINE COMPOSITION AND STONE RISK**

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INTRODUCTION AND OBJECTIVE: Pregnancy is associated with an increased lifetime prevalence of nephrolithiasis. During pregnancy, purported changes in urinary milieu include hypercalciuria and alkaline urine pH, which may predispose to calcium phosphate (CaPhos) urolithiasis. Postpartum, it is unknown whether the cumulative number of pregnancies is associated with persistent risk of these findings and CaPhos stone formation. We studied the effect of prior pregnancies on the urinary milieu and stone composition in a cohort of female stone formers.