Diabetics on Metformin Experience Increased Stone Episodes Compared to Non-Metformin users

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Introduction and Objectives
Diabetics are prone to develop kidney stones and this is theorized to be partly due to metabolic acidosis. Metformin has been contraindicated in patients with renal insufficiency because of its effect on lactic acidosis. To our knowledge no prior studies have evaluated the effect of metformin on kidney stone production in diabetic patients. We explored the relationship between metformin use and kidney stone formation among diabetics.

Methods
Online medical records of all patients treated at a single institution between 08/2006 and 08/2014 were queried using a data mining software tool. ICD/CPT codes were used to identify patients based on diagnosis of diabetes mellitus type-2, metformin use, and diagnosis of urolithiasis. Chi-square test was performed to compare the prevalence of stones between the two groups; ANOVA was used to compare age and urine pH.

Results
Diabetic patients (N=47,170) who were on metformin (N=10,016) had 414 stone episodes (Gp A) compared to 936 (Gp B) stone episodes among non-metformin users (N=37,154). Metformin users had an odds ratio (OR) of 1.67 for being diagnosed with urolithiasis (4.13% vs 2.52%, $p < 0.01$). Diabetic stone formers were older than non-diabetic stone formers ($p <0.001$), and had a lower urine pH ($p<0.001$). There was no difference in age and urine pH between metformin stone formers non metformin stone formers.

Conclusions
Diabetic patients on metformin have higher incidence of kidney stones compared to diabetic patients not on metformin. Further studies are warranted to prospectively evaluate the incidence of urolithiasis among metformin users and to explore possible etiologies.

Table 1.- Characteristics of Patients with Stone disease.

	Non Diabetic stone formers	All Diabetic stone formers	Diabetic stone formers on Metformin	Diabetic stone formers not on Metformin
N	13,722	1,350	414	936
Males	7759 (56.5%)	762 (56.4%)	231 (55.8%)	531 (56.7%)
Mean Age	55.5**	64.6**	65.3	64.3
Urine pH (Mean)	6.1**	5.9**	5.87	5.94
** $p < 0.01$				