The Feasibility of Using Urine Osmolality as Reflection of Vasopressin Levels and Prognosis in Patients with ADPKD

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Introduction

- Vasopressin plays an essential role in osmoregulation, but has deleterious effects in patients with ADPKD

- Increasing water intake to suppress vasopressin activity has been suggested as potential renoprotective strategy

Study Aim

- To investigate whether urine osmolality can be used to identify ADPKD subjects that may benefit from increasing water intake

Study Questions

- To investigate the association of urine osmolality and urine to plasma osmolality ratio with plasma copeptin concentration (as surrogate for plasma vasopressin concentration) and whether these associations depend on disease severity

- To investigate whether urine osmolality, urine to plasma osmolality ration and plasma copeptin are associated with change in renal function during follow-up

Methods

- Urine and plasma osmolality and plasma copeptin concentration were measured in 94 ADPKD subjects

- mGFR was measured as ^{125}I-iothalamate clearance and Total Kidney Volume (TKV) by MRI.

- Change in estimated GFR (eGFR) was assessed in 55 ADPKD patients during a mean follow-up time of 2.8 yrs

Conclusions

- **Urine osmolality is not a valid measure to identify ADPKD subjects that may benefit from increasing water intake**

- **For this purpose measuring copeptin levels may be a better alternative**

Baseline characteristics

	All n=94	mGFR ≤ 60 n=30	mGFR > 60 n=64
Age (y)	40	47	38*
Male (%)	59.6	70	54.7
Antihypertensives (%)	75.5	96.7	65.6*
Systolic blood pressure (mmHg)	128	130	128
Diastolic blood pressure (mmHg)	79	80	79
Plasma creatinine (umol/l)	123	208	82*
Plasma osmol (mOsm/kg)	289± 7	292 ± 7	289 ± 7*
Plasma copeptin (pmol/L)	7.3 (3.2 – 14.6)	19.4 (12.0 – 34.6)	4.5 (3.1 – 9.1)*
mGFR (mL/min/1.73m²)	77 ± 32	38 ± 15	95 ± 18*
24h urine volume (L)	2.35 (1.79 – 2.76)	2.58 (2.06 – 3.23)	2.15 (1.65 – 2.65)*
24h urine osmol (mOsm/kg)	420 ± 195	329 ± 79	459 ± 164*
Urine to plasma osmolality ratio	1.4 (1.1 – 1.8)	1.3 (1.0 – 1.3)	1.5 (1.2 – 2.1)
Total Kidney Volume (L)	1.55 (0.99 – 2.40)	2.20 (1.42 – 3.12)	1.36 (0.08 – 1.84)*

*, $p < 0.05$ versus group with mGFR ≤ 60 ml/min*1.73m2.

Baseline associations
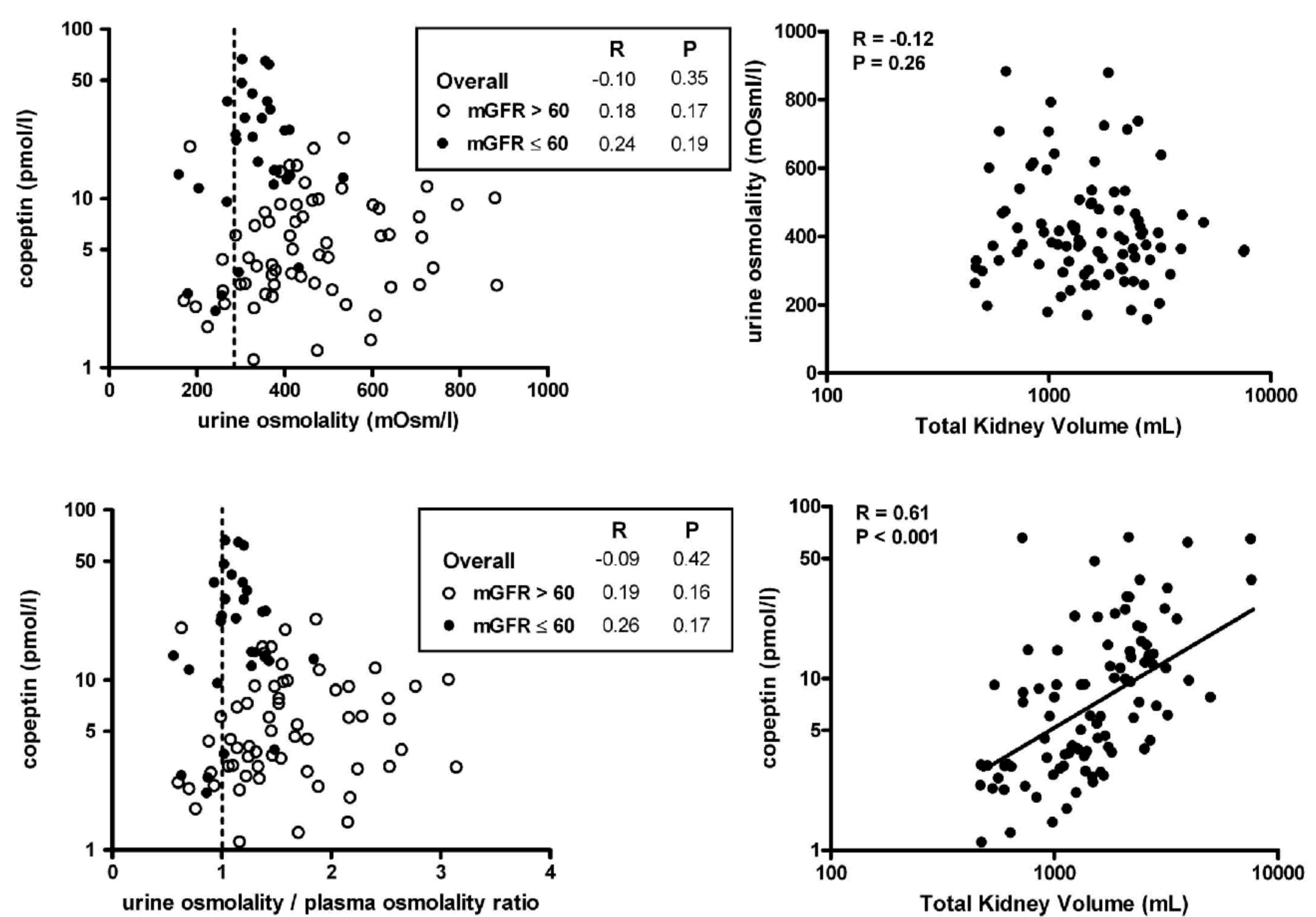
Associations with change in eGFR during FU

	Model 1 β	Model 1 p-value	Model 2 β	Model 2 p-value	Model 3 β	Model 3 p-value
Uosm	+0.11	0.43	+0.17	0.30	+0.14	0.34
Age			+0.10	0.54	+0.21	0.18
Male sex			+0.18	0.22	-0.06	0.71
TKV					-0.53	0.001
Uosm/Posm ratio	+0.09	0.53	+0.16	0.37	+0.13	0.40
Age			+0.09	0.59	+0.21	0.20
Male sex			+0.17	0.26	-0.04	0.78
TKV					-0.52	0.002
Copeptin	-0.41	0.003	-0.43	0.006	-0.23	0.048
Age			-0.34	0.71	+0.14	0.30
Male sex			-0.15	0.83	-0.12	0.41
TKV					-0.41	0.02

Change in eGFR during follow-up (as dependant variable) in 55 ADPKD patients.

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