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The Clinical Characteristics of Advanced Chronic Kidney Disease with Small Total Kidney Volume in Autosomal Dominant Polycystic Kidney Disease: A Subgroup Should Be Spotlighted

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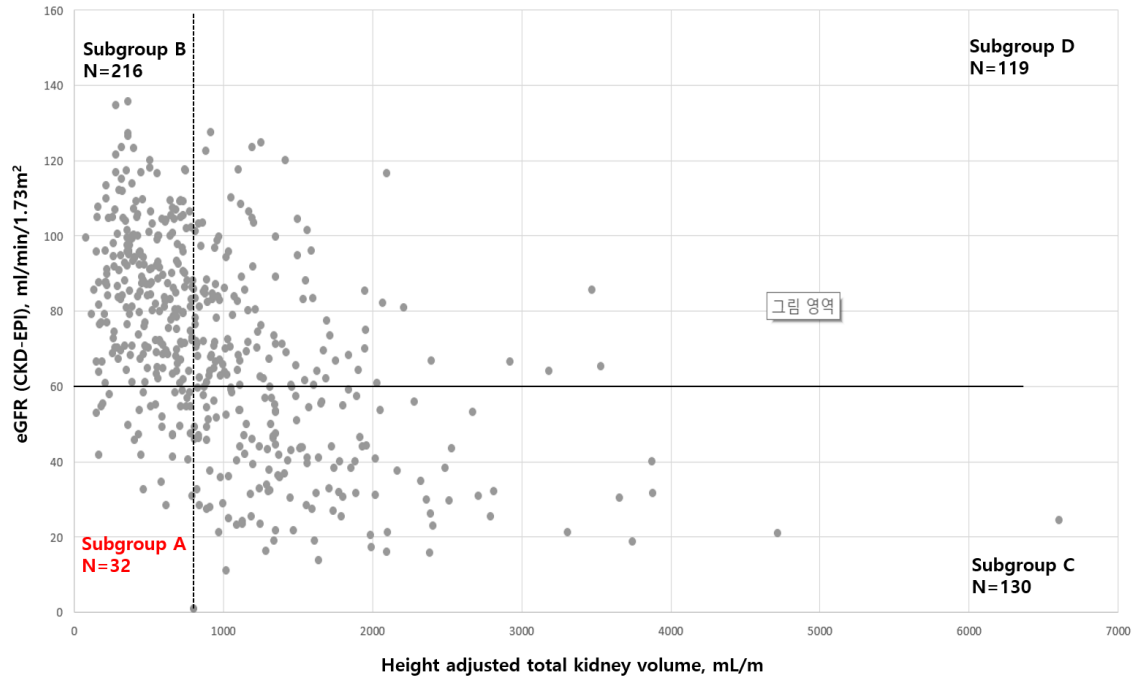
Objectives: In the defining the rapid progressor in autosomal dominant polycystic kidney disease (ADPKD), height adjusted total kidney volume (htTKV) is one of most important surrogate marker of disease progression. However there are subgroups of ADPKD patients with advanced chronic kidney disease (CKD) patients without significant increase in htTKV. In here, we conducted a study to find out the clinical characteristics of the population.

Methods: This is a cross-sectional study, done in the outpatients from Seoul National University Hospital ADPKD clinic. Total 497 adult patients were enrolled and demographic information, medical history, laboratory results, PKD gene genotypes and ellipsoid htTKV value from CT or MRI images were collected. The patients were classified into four subgroups based on htTKV (800mL/m) and CKD stages as follow: Subgroup A as CKD stage G3-G5 and htTKV<800mL/m, subgroup B as CKD stage G1 and 2 and htTKV<800mL/m, subgroup C as CKD stage G1&2 and htTKV<800mL/m and subgroup D as CKD stage G3-5 and htTKV≥800mL/m.

Results: Mean age was 48.9±11.5 years and 51.5% were female. Mean eGFR was 71.5±26.5 ml/min/1.73m² and the median htTKV were 800mL/m [IQR 472;1291]. In the study population, 6.4%, 43.5% and 26.2% were classified in to subgroup A, B and C respectively. (Figure) The patients in subgroup A were older, had higher uric acid level and more patients were taking uric acid lowering agents. The level of urine N-acetyl-β-D glucosaminidase/Creatinine(NAG/Cr) was significantly higher in subgroup A compared to B, even after age was adjusted. There were no significant differences in the genotypes, rate of blood pressure control, dyslipidemia, and history of acute kidney injury, acute pyelonephritis or urinary tract stone between subgroup A and B (Table).

Conclusions: High serum uric acid and urine NAG/Cr level were significant characteristics of ADPKD subgroup with advanced CKD stages and small htTKV compared to early CKD patients with small htTKV.

The scatter plot of htTKV and eGFR and classification of four subgroups



The characteristics difference between subgroup A, B and C

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Subgroup	A (N=32)	B (N=217)	C (N=130)	p-value A-B*	p-value A-C*	
Age (year)	56.9 ± 10.2	46.4 ± 12.3	53.5 ± 9.6	<0.001	0.079	
Female %	15 (46.9%)	120 (55.3%)	62 (47.7%)	0.482	1.0	
Body mass index (kg/m ²)	23.0 ± 2.5	23.0 ± 3.2	23.8 ± 3.0	0.960	0.165	
Estimated GFR (mL/min/1.73m ²)	49.0 ± 8.6	89.5 ± 16.4	38.8 ± 12.5	<0.001	<0.001	
Chronic kidney disease stage (%)	1	0 (0.0%)	105 (48.4%)	<0.001	<0.001	
	2	0 (0.0%)	112 (51.6%)			
	3a	24 (75.0%)	0 (0.0%)	43 (33.1%)		
	3b	7 (21.9%)	0 (0.0%)	53 (40.8%)		
	4	1 (3.1%)	0 (0.0%)	32 (24.6%)		
	5	0 (0.0%)	0 (0.0%)	2 (1.5%)		
HtTKV (median, IQR)	586.5 [430.5;716]	466.0 [335;646]	1417.5 [1126;1885]	0.041	<0.001	
PKD1/2 gene mutation analysis done	22(69%)	152(70%)	93(72%)	0.881	0.756	
PKD1/2 genotype	PKD1PT	9 (41%)	60 (39%)	57 (61%)	0.610	0.041
	PKD1NT	6 (27%)	52 (35%)	18 (19%)		
	PKD2	3 (14%)	24 (16%)	14 (15%)		
	No mutation	4 (18%)	16 (10%)	4 (5%)		
Prevalence of Diabetes Mellitus(%)	1 (3.1%)	6 (2.8%)	9 (6.9%)	1.0	0.697	
Prevalence of Hypertension	26 (81.2%)	154 (71.0%)	128 (98.5%)	0.317	<0.001	
Number of hypertension med	1.8 ± 0.9	1.6 ± 0.7	1.9±0.8	0.280	0.749	
Systolic blood pressure	128.8 ± 8.9	129.1 ± 12.3	130.1 ± 13.1	0.919	0.751	
Diastolic blood pressure	84.4 ± 8.1	82.7 ± 9.9	83.9 ± 9.5	0.364	0.776	
Dyslipidemia	14 (43.8%)	62 (28.7%)	62 (47.7%)	0.129	0.839	
Uric acid medication	14 (43.8%)	21 (9.7%)	82 (63.1%)	<0.001	0.073	
Hyperuricemia defined as uric acid level	8 (25.0%)	27 (12.4%)	55 (42.3%)	0.102	0.110	
Serum Uric acid level	6.4 ± 1.5	5.4 ± 1.3	6.6 ± 1.7	<0.001	0.495	
Urine NAG/Cr	9.5 ± 7.8	4.0 ± 2.1	7.1 ± 3.9	<0.001	0.249	
Hemoglobin	13.3 ± 1.8	14.8 ± 10.7	12.4 ± 1.5	0.081	0.003	
Platelet	211.6 ± 50.5	229.5 ± 54.3	205.5 ± 58.2	0.072	0.506	
Prevalence of Hematuria (dip stick ≥ 2+)	4 (12.5%)	26 (12.0%)	28 (21.5%)	1.0	0.367	
History of acute kidney injury within 1 year	1 (3.1%)	5 (2.3%)	29 (22.3%)	1.0	0.025	
History of acute pyelonephritis within 1 year	0 (0.0%)	2 (0.9%)	7 (5.4%)	1.0	0.392	
History of urinary tract Stone within 1 year	9 (28.1%)	60 (27.8%)	40 (30.8%)	1.0	0.939	

*p-value <0.012 are interpreted as statistically significant due to Bonferroni correction