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Association of GFR and Albuminuria with Mortality and End-Stage Renal Disease across Asians, Whites, and Blacks: A Collaborative Analysis of 45 Cohorts (for the CKD-PC Collaborators)

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BACKGROUND: Global interest in CKD has been increasing, but whether the impact of low GFR or high albuminuria, on clinical outcomes differs by race/ethnicity is yet unsettled.

METHODS: We studied 1,102,660 individuals (827,089 Asians, 227,821 whites, and 47,750 blacks) from 45 cohorts inthe CKD Prognosis Consortium (CKD-PC). The hazard ratios (HRs) of all-cause mortality and ESRD for estimated GFR (eGFR) by the CKD-EPI equation and albuminuria (ACR or dipstick) were quantified in each race. Most Asian studies used dipstick, while others more frequently used ACR. Meta-regression analysis was used to compare HRs across races.

RESULTS: For Asians, whites and blacks, mean age was 46, 63, and 59 years, and proportion with diabetes was 5%, 12% and 24%, respectively, with Asians having higher GFR and less albuminuria than others. Adjusted HR of mortality for eGFR and albuminuria compared to the reference group was similar in Asian, whites, and blacks (for example, for individuals with eGFR 30-44 ml/min/1.73m^2, the respective HR [95% CI] was 1.7 [1.5-2.0], 1.4 [1.3-1.6] and 2.0 [1.5-2.7] and for microalbuminuria [ACR 30-299 mg/g or dipstick 1+] 1.6 [1.4-1.8], 1.7 [1.5-1.9] and 1.8 [1.7-2.1], respectively). (Figure) Meta-regression comparisons were generally not significant and similar results were seen for ESRD.

CONCLUSIONS: Despite wide variability in clinical characteristics among cohorts and lower risk profile in Asians, the adjusted relative risks for mortality and ESRD according to low eGFR or high albuminuria were similar among Asians, whites and blacks.

Relative risk of mortality and ESRD according to eGFR and ACR/dipstick categories in whites, Asians, and blacks in general population cohorts

		All-cause mortality					ESRD				
		ACR/Dipstick					ACR/Dipstick				
	eGFR	<10 / Dip "-"	10-29 / Dip "±"	30-299 / Dip "1+"	300+ / Dip "≥2+"		<10 / Dip "-"	10-29 / Dip "±"	30-299 / Dip "1+"	300+ / Dip "≥2+"	
Asian	≥105	1.1	1.7	3.6	5.4	1.2			54.8	47.5	1.0
	90-104	REF	1.6	1.8	3.4		REF		8.3		
	75-89	1.0	1.3	1.6	2.5	0.9	1.8		5.4	72.1	2.1
	60-74	1.0	1.3	1.7	2.1	1.0	3.8	24.1	19.9	130	7.1
	45-59	1.3	2.0	1.8	2.8	1.3	17.2	64.6	116	577	27.6
	30-44	1.9	3.0	2.7	3.6	1.7	115	113	631	1426	93.6
	15-29	3.4	4.1	6.0	8.9	3.3	625	3813	2709	8170	526
	<15	8.2	8.1	4.7	11.8	4.1		20599	48789	37298	1545
			1.4	1.6	2.2			2.7	7.4	24.8	
White	≥105	1.2	2.0	2.9	7.6	1.3	3.7	17.4	27.4	54.3	8.6
	90-104	REF	1.6	1.7	4.0		REF	3.3	4.3	57.2	
	75-89	0.9	1.4	1.6	2.1	0.9	1.2	6.2	6.6	25.7	1.9
	60-74	1.0	1.5	1.8	2.5	1.0	3.9	5.8	17.4	43.0	4.1
	45-59	1.1	1.6	1.9	2.9	1.1	10.2	10.5	40.0	156	11.2
	30-44	1.5	2.2	2.6	3.9	1.4	46.5	37.6	265	512	50.8
	15-29	3.2	3.4	3.0	5.8	2.1	501	296	725	857	116
	<15	3.8	4.4	6.2	9.7	3.7		4132	1561	4680	375
			1.4	1.7	2.4			1.3	4.0	10.2	
Black	≥105	1.4	1.6	2.1	3.6	1.2	1.3	1.5	2.5	27.9	0.4
	90-104	REF	1.4	1.9	3.7		REF	2.6	7.3	26.5	
	75-89	1.1	1.5	2.1	3.2	1.0	0.8	3.8	8.5	50.6	1.2
	60-74	1.2	1.8	2.3	3.4	1.2	2.0	5.3	5.7	53.6	1.6
	45-59	1.3	2.4*	2.5	4.3	1.3	3.8	29.1	25.4	104	4.1
	30-44	2.3	2.0	4.3	5.9	2.0*	69.7	34.9	101	392	12.4
	15-29	2.3	5.1	4.9	5.3	2.0	238	159	395	692	26.1
	<15		21.3	14.8	11.7	4.4			2142	1439	44.3
			1.4	1.8	2.7			1.9	5.6	20.4	

Each number represents a pooled hazard ratio from meta-analysis adjusted for covariates and compared with the reference cell (REF) within each race. Bold numbers indicate statistical significance at $P<0.05$. Green, yellow, orange, and red colors indicate quartiles of risk from low to high, respectively. All hazard ratios for blacks and Asians are compared with those for whites for interaction using meta-regression, and stars (*) indicate a significant interaction at $P<0.05$. Colors reflect ranking of relative risk.