

PULMONARY HYPERTENSION IS ASSOCIATED WITH MORTALITY AND CARDIOVASCULAR EVENTS IN CHRONIC KIDNEY DISEASE PATIENTS

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OBJECTIVES

Pulmonary hypertension is an emerging risk factor of mortality in general population. We evaluated the prevalence and determinants of pulmonary hypertension in chronic kidney disease patients and its prognosis value.

METHODS

We conducted a prospective study. Including stages 3 to 5 non dialysis dependent chronic kidney disease patients. We used multivariable logistic regression models to analyze the independent predictors of pulmonary hypertension. We also did multivariable adjusted Cox hazard models for all-cause mortality and cardiovascular events. Pulmonary hypertension was estimated by Doppler echocardiography and defined as a pulmonary artery systolic pressure above 35 mmHg.

RESULTS

Figure 1. Kaplan-Meier cumulative survival curve all-cause mortality.

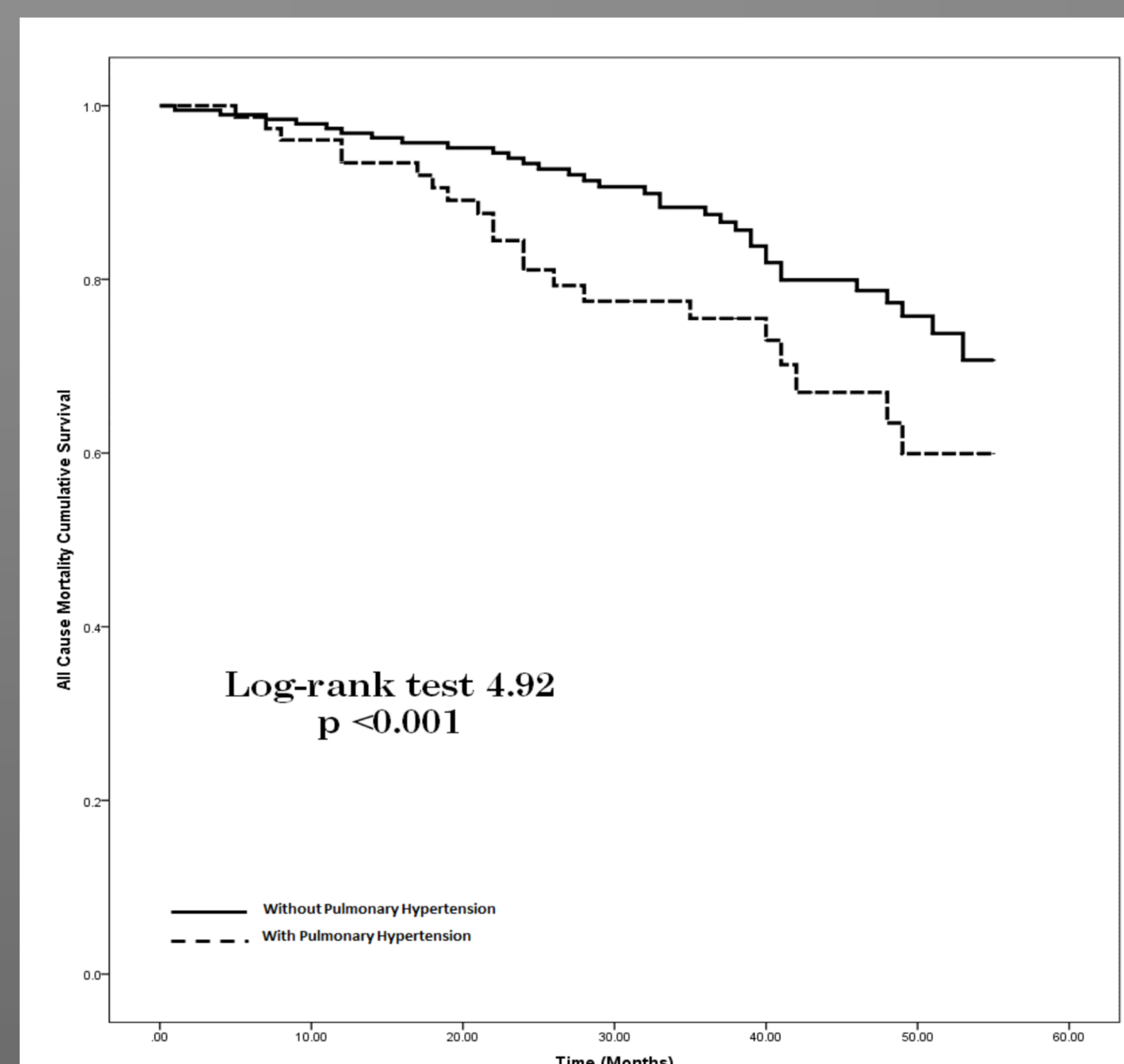
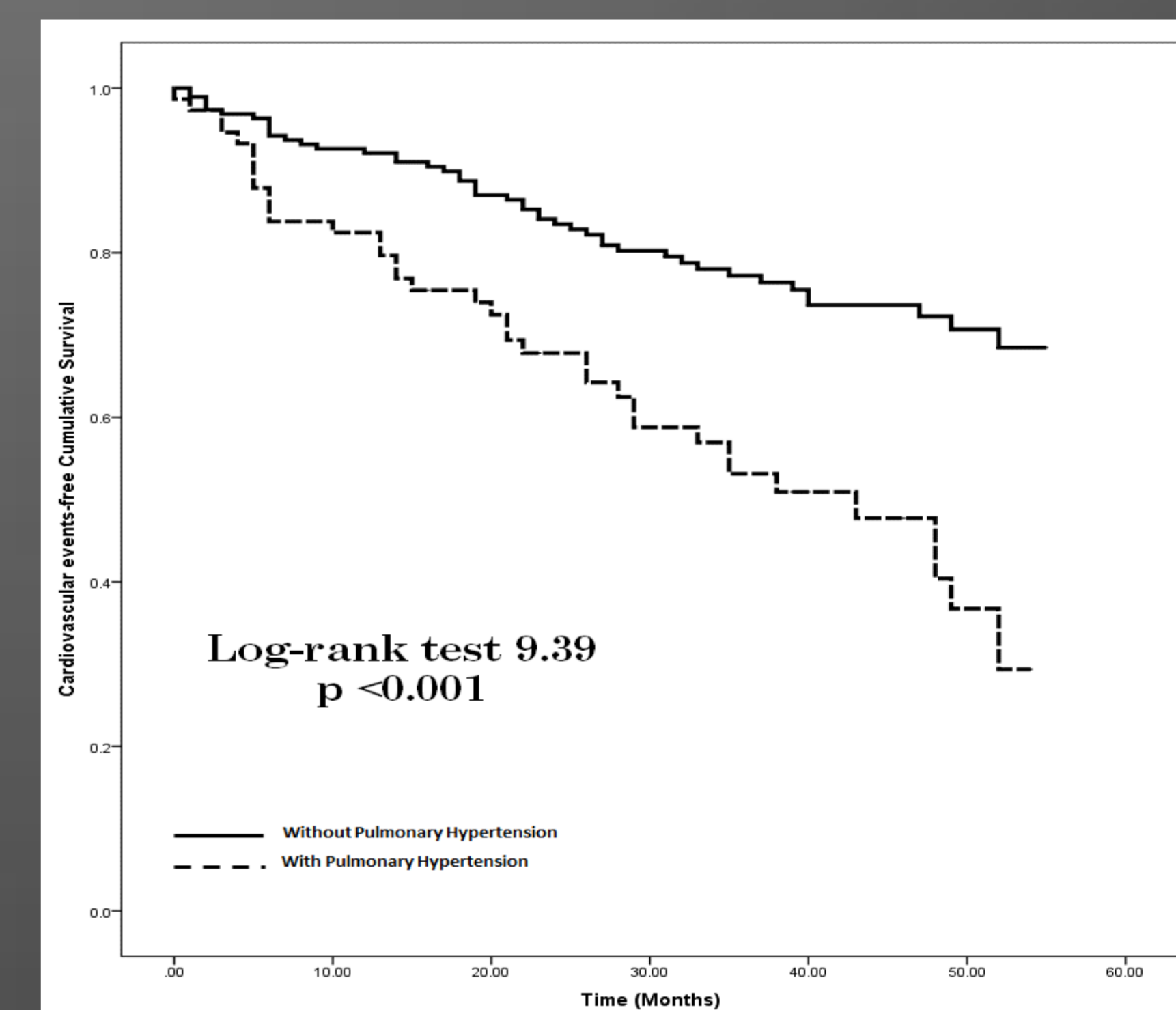


Figure 2. Kaplan-Meier cumulative survival curve for cardiovascular events.



	All 353 (100%)	Pulmonary hypertension present 94 (26.6%)	Pulmonary hypertension absent 259 (73.4%)	p
Gender (male)	193 (54.7%)	49 (52.1%)	144 (55.5%)	0.6
Age (years)	67 ± 13	72 ± 11	64 ± 14	<0.001
Body Mass Index (Kg/m ²)	27.2 ± 4.2	27.1 ± 4.6	27.4 ± 4.2	0.3
Hypertension	230 (65.1%)	67 (71.2%)	163 (63%)	0.09
Diabetes mellitus	154 (43.6%)	44 (24.4%)	110 (42.5%)	0.08
Chronic obstructive pulmonary disease	19 (5.4%)	7 (6.6%)	12 (4.6)	0.06
Obstructive sleep apnea	12 (3.4%)	4 (4.2%)	8 (3.1)	0.07
Etiology of ESKD				
• Diabetes mellitus	82 (23.2)	22 (24.4)	60 (23.1)	0.3
• Hypertension	90 (25.5)	23 (24.5)	67 (25.8)	0.4
• Glomerulonephritis	76 (21.5)	19 (20.2)	57 (22)	0.3
• Interstitial	40 (11.3)	10 (10.6)	30 (11.6)	0.3
• APKD	25 (7.1)	6 (6.3)	19 (7.3)	0.4
• Other	43 (12.2)	10 (10.6)	33 (12.7)	0.1
Estimated GFR (ml/min/m ²)	18.9 ± 8.1	15.1 ± 9.1	21.3 ± 8.8	0.04
Systolic blood pressure (mmHg)	141 ± 19	140 ± 18	142 ± 18	0.4
Diastolic blood pressure (mmHg)	82 ± 16	80 ± 15	83 ± 17	0.4
History of smoking				
• Current	65 (18.4)	18 (19.1)	47 (18.1)	0.2
• Past	87 (24.6)	27 (28.7)	60 (23.1)	0.09
Previous CV disease	95 (26.9)	33 (35.1)	62 (23.9)	0.001
Albumin (g/dL)	4.3 ± 0.2	4.1 ± 0.3	4.4 ± 0.2	0.7
C-reactive protein (mg/dL)	0.7 (0.24-0.98)	1.2 (0.6-2.1)	0.6 (0.24-1.1)	0.04
NT-Pro-BNP (ng/L)	45 (28-200)	209 (98-457)	33 (28-38)	< 0.001
Hs-TnT (ng/L)	50 (10-128)	64 (12-152)	40 (10-98)	0.001
Calcium (mg/dL)	9.4 ± 0.6	9.5 ± 0.6	9.4 ± 0.6	0.4
Phosphorus (mg/dL)	4.6 ± 0.9	5.5 ± 0.8	4.4 ± 0.7	0.04
Parathyroid hormone (mg/dL)	120 (85-150)	156 (82-325)	98 (72-125)	0.001
Hemoglobin (g/dL)	12.8 ± 0.4	13.1 ± 0.5	12.5 ± 0.3	0.06
Arteriovenous fistulae	8 (2.2)	4 (4.2)	4 (1.5)	0.04
Systolic dysfunction	74 (21)	30 (32)	44 (16.9)	< 0.001
Diastolic dysfunction	69 (19.5)	28 (29.7)	41 (15.8)	0.01
Left ventricular hypertrophy	92 (26)	27 (28.7)	62 (25.1)	0.07
Medications				
• Anti-hypertensive	210 (59.4)	57 (60.6)	153 (59)	0.3
• Antiaggregant	97 (27.4)	28 (29.7)	69 (26.6)	0.06
• Epoetin	36 (13.5)	14 (14.8)	32 (12.3)	0.09

CONCLUSIONS

Pulmonary hypertension prevalence is high among chronic kidney disease patients, this prevalence increases as renal function decreases. Main determinants of pulmonary hypertension are age, estimated glomerular filtration rate, previous cardiovascular disease Nt-Pro-BNP levels, the presence of an arteriovenous fistulae and left ventricular systolic or diastolic dysfunction. Pulmonary hypertension is an independent predictor of all-cause mortality and cardiovascular events among this patients.

	Unadjusted		Adjusted ^a	
	HR (CI 95%)	p	HR (CI 95%)	P
CARDIOVASCULAR EVENTS				
Age (years)	1.04 (1.01-1.06)	0.01	1.01 (0.98-1.01)	NS
Previous cardiovascular disease	4.96 (4.03-13.08)	< 0.001	4.06 (2.19-7.53)	0.01
Diabetes mellitus	1.98 (1.25-2.76)	0.01	1.25 (1.09-1.75)	0.04
Hs-TnT (1ng/L)	1.01 (1.00-1.02)	< 0.001	1.01 (0.98-1.01)	NS
Pulmonary hypertension	3.02 (1.66-5.50)	< 0.001	2.77 (2.00-3.25)	< 0.001
Diastolic dysfunction	4.41 (2.37-7.25)	< 0.001	1.87 (1.11-3.17)	0.01
Systolic dysfunction	2.25 (1.26-4.00)	0.04	1.01 (0.99-2.96)	NS
ALL CAUSE MORTALITY				
Age (years)	1.02 (1.00-1.04)	0.03	1.01 (0.99-1.12)	0.01
Previous cardiovascular disease	2.09 (1.38-3.09)	< 0.001	1.68 (1.06-2.64)	0.01
C-reactive protein	1.23 (1.09-1.35)	< 0.001	1.09 (0.98-1.10)	NS
Pulmonary hypertension	3.14 (1.53-4.95)	< 0.001	1.84 (1.06-3.18)	0.02
Diastolic dysfunction	3.25 (2.13-5.89)	< 0.001	1.78 (1.13-1.97)	0.01
Systolic dysfunction	2.15 (1.25-2.60)	0.01	1.12 (1.02-1.19)	0.04

DIAVERUM