

VASCULAR CALCIFICATION IN PATIENTS WITH CHRONIC KIDNEY DISEASE STAGES 4 & 5. "RECAVAS" STUDY

Jose Luis Gorriz¹, Pablo Molina¹, Verónica Escudero¹, Sandra Beltrán¹, M^a Dolores del Pino², Mercedes Salgueira³, Cristina Castro¹, Jonay Pantoja¹, Mercedes Gonzalez-Moya¹, Luis M Pallardo¹, On behalf of the RECAVAS Study Group Investigators.

¹Hospital Universitario Dr Peset, Nephrology, Valencia, ²Hospital Torrecárdenas, Almería, Unidad Nefrológica Intercentro y Urología HVR, Sevilla. (SPAIN)

INTRODUCTION

Vascular calcification (VC) assessed by X-ray (Adragao score / Kauppila score) of CT scan (Agatston score), has demonstrated to be a potent independent predictor of higher hospitalization and higher mortality in patients on dialysis as well as chronic kidney disease patients not on dialysis¹⁻⁷.

The administration of calcium-based phosphate binders is the most commonly used treatment for hyperphosphatemia and secondary hyperparathyroidism, but it may often produce a calcium overload in patients, particularly when used in combination with Vit D. VC increases with use of phosphate calcium based binders⁴.

These data will be useful for nephrologist to detect vascular calcifications in their own patients treated with CBBs.

OBJECTIVE

The aims of this study were:

- Analyze the prevalence of vascular calcification (VC) in patients with CKD stage 4-5 not on dialysis and 5D (Hemodialysis) (HD) and Peritoneal Dialysis (PD), previously treated with calcium phosphate binders based for at least 12 months.
- Analyze the correlation between VC assessed by Adragao score (X-ray pelvis and hands) and Kauppila score (X-ray lateral lumbar spine), and biochemical parameters (calcium, phosphorus, i-PTH and 25-OH vitamin D).
- Analyze the type of phosphate binders used, and the degree of accomplishment of KDIGO guidelines recommendations.

PATIENTS & METHODS

RECAVAS ("Registro de Calcificación VasculAr en pacientes con CKD estadios 4-5-5D") is a transversal, national, observational and multicenter study.

INCLUSION CRITERIA:

- Age > 18 year.
- Patients with CKD stages 4 and 5 not on dialysis and patients on dialysis (5D), hemodialysis and peritoneal dialysis, followed up in the participating centres incidental and prevailing (at least 6 months), under treatment for hyperphosphatemia with at least one calcium-based phosphate binder during at least 12 months.
- Patients must be able to give consent.
- A systematic, consecutive sampling of patients was conducted during inclusion period until the desired number was reached.

EXCLUSION CRITERIA :

- Acute renal failure.
- Patients not currently under treatment with a calcium-based binder
- Patients who have not been receiving treatment with a calcium binder for at least 12 months.
- Wasting disease, malignancy, incapacitating disease, or active infection/inflammation.
- Inability to give oral or witnessed informed consent

From January 2014 to November 2014 May 2007, 993 consecutive patients from 101 centres were included.

VC was considered prominent if Adragao score ≥ 3 or Kauppila score >6

Patients included:

- CKD 4-5 not on dialysis:** 192 (19.3 %)
- Hemodialysis:** 677 (68.2 %)
- Peritoneal Dialysis:** 124 (12.5 %)

The study was evaluated by the Ethical Committee of Clinical Investigation (CEIC) of the H. Universitario Doctor Peset in Valencia, Spain.

CHARACTERISTICS OF THE PATIENTS

	CKD 4-5 not on dialysis (N=202)	Hemodialysis (n=681)	Peritoneal Dialysis (n=110)	Total (n=993)
Age, years	68 ±14	64 ±14	60 ±14	65 ±14
Male gender (%)	58.4 %	57.3 %	61.5 %	60.4 %
Kauppila >6	43.2 %	56.2 %	38.7 %	51.5 %
Adragao ≥ 3	46.9 %	57.9 %	41.9 %	53.8 %
Adragao hands >0	54.7 %	58.4 %	46.8 %	56.2 %
Complies with Calcium (DOQI)	65.5 %	62.1 %	60.9 %	62.2 %
Complies with phosphorus (DOQI)	74.3 %	56.8 %	67.3 %	61.5 %
Complies with i-PTH (DOQI)	25.2 %	33.5 %	43.6 %	32.8 %
25 OH vitamin D > 30 ng/ml	22.5 %	12.9 %	19.9 %	19.5 %

TREATMENTS RECEIVED

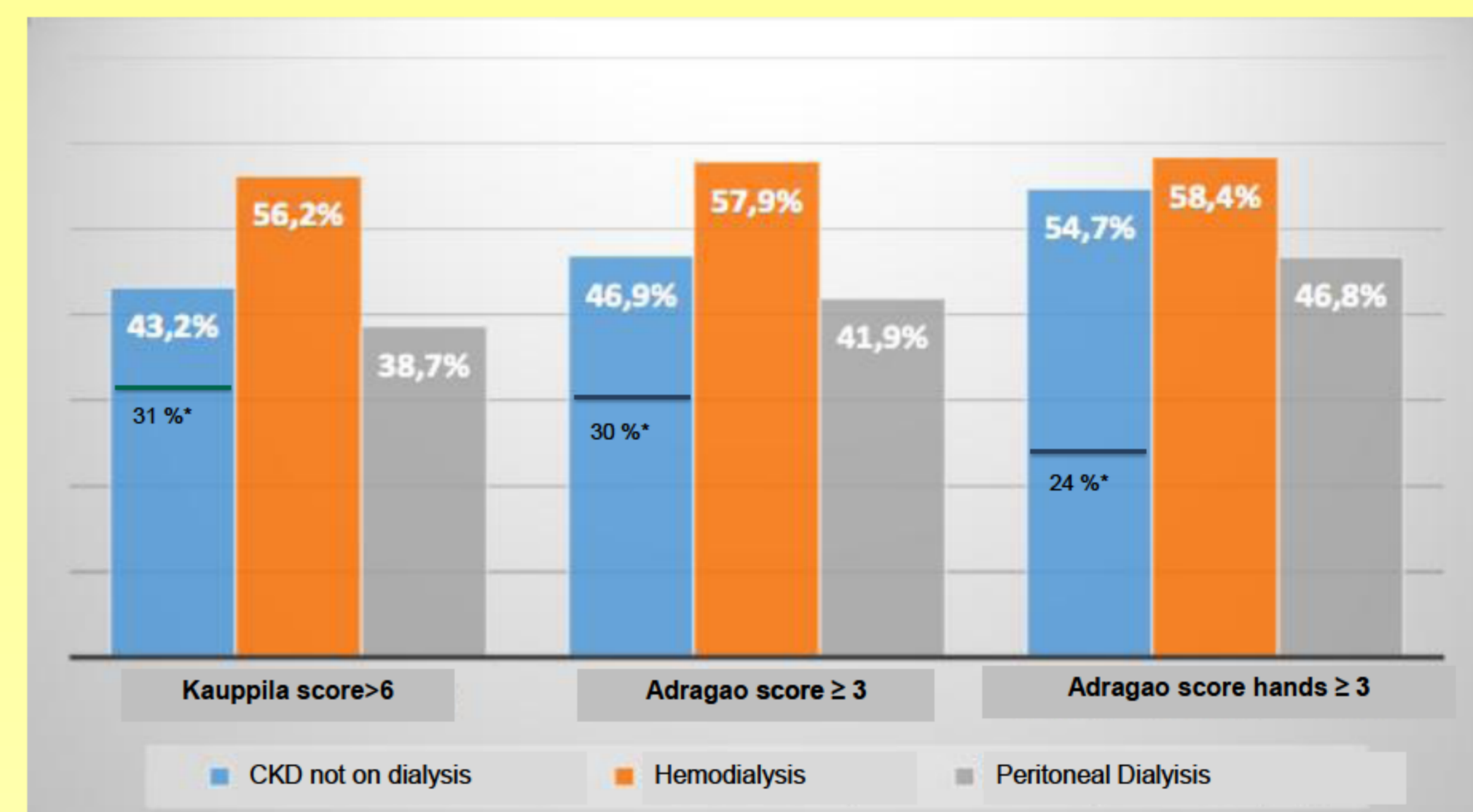
	CKD 4-5 not on dialysis (N=202)	Hemodialysis (n=681)	Peritoneal Dialysis (n=110)	Total (n=993)
Calcimimetics	9.9 %	28.9 %	22.7 %	24.3 %
Native vitamin D	41.1 %	25.6 %	38.2 %	30.2 %
Paricalcitol	45.5 %	50.0 %	49.9 %	49.3 %
Alfacalcidol	3.0 %	3.1 %	3.1 %	3.1 %
Calcitriol	19.8 %	5.4 %	6.1 %	8.8 %
Calcium carbonate	50.4 %	38.0 %	38.2 %	41.3 %
Calcium acetate	49.6 %	65.6 %	61.8 %	62.4 %
Magnesium carbonate	28.2 %	20.0 %	25.6 %	25.5 %
Lanthanum carbonate	26.7 %	32.4 %	28.1 %	30.8 %
Sevelamer hydrochloride	25.7 %	14.5 %	14.5 %	16.8 %
Sevelamer carbonate	36.1 %	38.0 %	49.0 %	38.8 %

RESULTS

PREVALENCE OF VASCULAR CALCIFICATIONS*

***Prominent vascular calcifications (Kauppila >6, Adragao ≥ 3 , Adragao-hands >0)**

83.7 % of the patients present some degree of vascular calcification



*Prevalence of vascular calcifications (Adragao scores /Kauppila score) in OSERCE II study (CKD 3-4 not on dialysis)⁷

Correlation with Kauppila score > 6 (Multiple regression analysis)

N=951	Coefficient (not standardized)		P	95 % confidence interval for B	
	B	Std error		Lower bound	Upper bound
Age (cont variable)	0.160	0.014	<0.001	0.133	0.187
Diabetes mellitus (yes/no)	1.864	0.427	<0.001	1.026	2.701
Current smoking (yes/no)	2.231	0.477	<0.001	1.296	3.167

Correlation with Adragao score ≥ 3 (Multiple regression analysis)

N=951	Coefficient (not standardized)		P	95 % confidence interval for B	
	B	Std error		Lower bound	Upper bound
Age (cont)	0.044	0.006	<0.001	0.033	0.055
Diabetes mellitus (yes/no)	1.547	0.175	<0.001	1.203	1.892
25 OH vitamin D	-0.014	0.007	0.032	-0.027	-0.001

Multivariate analysis Kauppila score > 6 (Logistic regression)

	OR	95% CI	P
Age (continuous variable)	1.057	1.046 - 1.069	<0.001
Diabetes mellitus (yes/no)	1.741	1.298 - 2.335	<0.001
Current smoking (yes/no)	2.082	1.483 - 2.924	<0.001
i-PTH (continuous variable)	1.001	1.000 - 1.001	<0.001

Multivariate analysis Adragao score ≥ 3 (Logistic regression)

	OR	95% CI	P
Age (continuous variable)	1.040	1.029 - 1.050	<0.001
Male gender (male/female)	0.680	0.516 - 0.896	0.006
Diabetes mellitus (yes/no)	2.710	2.017 - 3.641	<0.001
i-PTH (continuous variable)	1.001	1.000 - 1.001	<0.001

CONCLUSIONS

In our study, CKD patients showed a high prevalence of vascular calcification, that was higher in hemodialysis patients. Vascular calcification was correlated with modifiable and non-modifiable factors. A considerable percentage of patients receive doses of calcium above KDIGO guidelines. These data should warn about the caution in the use of high doses of calcium-based phosphate binders in patients with vascular calcification.

REFERENCES

- Adragao T. *Nephrol Dial Transplant*. 2004;19:1480-1488.
- Okuno S. *Am J Kidney Dis*. 2007;49:417-425.
- Adragao T. *Nephrol Dial Transplant*. 2009; 24:997-1002.
- London GM, et al. *Nephrol Dial Transplant*. 2003;18:1731-1740.
- Blacher J, et al. *Hypertension*. 2001; 38:938-942.
- Watanabe R. *Clin J Am Soc Nephrol*. 2010;5:189-194.
- Gorriz JL. *Clin J Am Soc Nephrol* 2015; 10: 654-666

Study sponsored by:

