Effect of vitamin K2 substitution on vascular calcification and early atherosclerotic changes in patients with chronic kidney disease – preliminary results

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OBJECTIVES

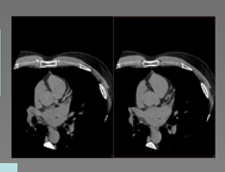
Vascular calcification and accelerated atherosclerosis are highly prevalent in patients with chronic kidney disease (CKD) and both have been associated with increased risk of cardiovascular events. Although vitamin K2 may be protective against vascular calcification the role of vitamin D in promoting atherosclerosis and vascular calcification remains much more controversial and depending mostly on dose

Aim of the study was to assess the effect of substitution of vitamin K2 with small dose of vit D3 compared to vit D3 alone on development atherosclerosis and coronary artery calcification in 3-5. stage CKD non-dialyzed patients

METHODS

Study design

73 CKD patients



Screening

40 patients with CACS ≥ 30

Randomization
Supplementation for 270 days

90 µg menaquinone (K_2) + 10 µg cholecalciferol (D_3) (group K+D; n=*28*)

10 µg cholecalciferol (D_3) (group D; n=*12*)

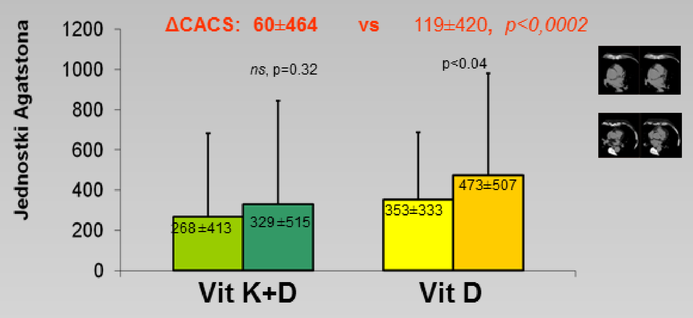
Study population

Age (Years)	F (*n=17*)	M (*n=23*)
	56 ± 1,5	60 ± 3,0
(eGFR ml/min/m²)	24,8 ± 11,2	
BMI	28,6 ± 4,9	
Cause of CKD	Glomerulonephritis	14
	Diabetes mellitus	8
	Polycistic kidney diseases	4
	Hypertension nephropathy	5
	Tubulointestinal nephropathy	2
	Unknown	5

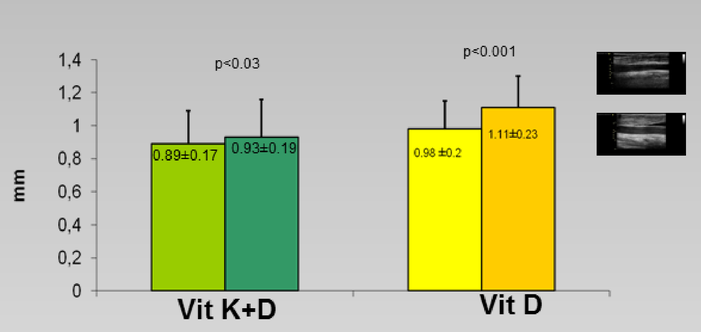
The assessments before and after 270 ± 24 days of treatment :
- coronary artery calcification (CACS)
- common carotid intima media thickness (CCA-IMT)
- laboratory parameters

RESULTS

Coronary artery calcification score (CACS) before and after 270-days treatment



Common carotid intima media thickness (CCA-IMT) in before and after treatment



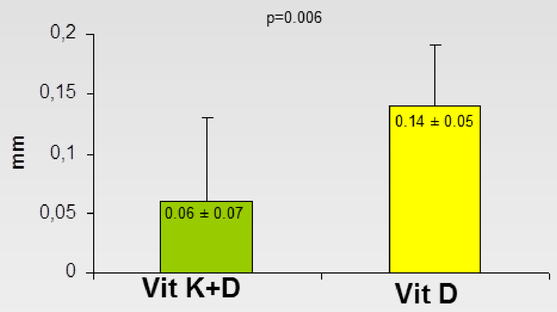
Anthropometric and laboratory parameters before and after the treatment

Parametr	Units	Vit K+D (n= 28)			Vit D (n=*12*)		
		Before treatment (n= 28)	After treatment (n= 26)	p	Before treatment (n=12)	After treatment (n=11)	p
Age	*years*	59,4 ± 9,6			55,4 ± 15,2		*ns*
BMI	*kg/m²*	30 ± 4,7	29,8 ± 4,1	*ns*	28,2 ± 5 ,2	28,5 ± 4,,9	*ns*
Serum creatinine	*mg/dL*	3,3 ± 1,5	4,3 ± 2,8	*ns*	2,5 ± 0,8	2,6 ± 1	*ns*
eGFR	*ml/min/m²*	21 ± 10,3	19 ± 11,8	*ns*	30,3 ±12,7	30,0 ±13,8	*ns*
Uric acid	*mg/dL*	6,8 ± 1,4	6,5 ± 1,3	O,02	8,5 ± 1,9	7,9 ± 1,3	*ns*
Cholesterol	*mg/dL*	214,8 ±68	218,9 ±56	*ns*	167,5 ±32,9	186,8 ±40,2	0,06
Triglycerides	*mg/dL*	215,2±121	198±113	*ns*	140 ± 48,8	149 ±52	*ns*
LDL-cho	*mg/dL*	122,9±51,4	126±49,3	*ns*	96,7 ±21,8	108 ±33,1	*ns*
HDL-ch	*mg/dL*	45,8±10	54,2 ±21	*ns*	45,8 ±10	51,3 ±21,8	O,02
Calcium	*mg/dL*	2,4 ± 0,1	2,4 ± 0,2	*ns*	2,4 ± 0,1	2,5 ±0,2	*ns*
Phosphates	*mg/dL*	1,35 ± 0,4	1,55 ± 0,6	*ns*	1,1 ±0,2	1,2 ± 0,2	0,05
PTH	*pg/mL*	195 ± 146	248,3 ±258	*ns*	133,2 ± 80,6	117,6 ±64,8	*ns*
Glucose	*mg/dL*	113± 29	109 ± 35,5	*ns*	107,1 ±38,3	127,5 ±66,5	*ns*
Hemoglobin	*g/L*	11,8±1,4	11,5 ±1,9	*ns*	13,2 ±1,6	13,7 ±1,8	0,02
Total protein	*mg/dL*	70,7±5,4	68,6 ± 8,9	*ns*	71,4 ±4	70,5 ±1,9	*ns*
Albumin	*mg/dL*	40,7±3,6	40,7 ±3,7	*ns*	42,4 ±2	42,3 ±2,2	*ns*
CRP	*ng/mL*	4,7 ±2,7	11 ±15,4	*ns*	4,66 ±4,2	3,3 ±2,6	*ns*

The change of coronary artery calcification (ΔCACS) during 270-days treatment

CACS	Patient's number (n=37)	
	Vit K+D (*n=26*)	**Vit D** (*n=11*)
decrease	5 (*5,4±5,2 jA*)	0
unchanged	2	0
increase	19	11

The change of intima media thickness (ΔCCA-IMT) during 270-days of treatment



CONCLUSION

Vitamin K2 therapy may slow the progression of atherosclerosis and vascular calcification in non-dialyzed CKD patients.

ClinicalTrials.gov Identifier: NCT01101698.

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