Is it worth measuring Free 25 OH Vitamin D in CKD patients?

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Introduction:

Most chronic kidney disease (CKD) patients suffer from vitamin D deficiency, which might contribute to adverse health outcomes. It has been proposed that serum free 25(OH) vitamin D (free 25(OH)D) better reflects vitamin D metabolism. We aim to evaluate whether serum free 25(OH)D varies regarding the different stages of CKD, in comparison with total 25(OH)vitamin D (total 25(OH)D).

Patients and methods:

We prospectively assessed 71 CKD patients during a glomerular filtration rate measurement (GFR) by **inulin clearance**. We measured serum free 25(OH)D by ELISA (DiaSource, Leuven, Belgium) and total 25(OH)D by immunoluminometry (DiaSorin, Italy).

Results:

- Patients were aged 57.1 ± 13.8 yrs. Mean GFR was 53.5 ± 21.3 mL/min.1.73m^2. Serum total 25(OH)D was 28.9 ± 10.7 ng/mL and serum free 25(OH)D was **5.97 ± 2.06 pg/mL**. (table 1)
- Free 25(OH)D was strongly correlated to total 25(OH)D (r= 0.88, p < 0.001). (Figure 1). There was **no correlation between free 25(OH)D and GFR** (r= -0.07, p= 0.28*).* (Figure 2)
- We did not find any relationship between free 25(OH)D nor total 25(OH)D and measures of mineral metabolism.
- Of interest, **percentage of free 25(OH)D** calculated with free 25(OH)D/ total 25(OH)D ratio was **higher in patients with vitamin D deficiency**; 0.24 ± 0.03 versus 0.19 ± 0.03, p<0.001.

Table 1. Clinical and biochemical characteristics of patients, patients n=71, controls n=14

Characteristics	Value	
	Patients	Controls
Age (yrs)	57.1 ± 13.8	47.8 ± 14.0
BMI (kg/m2)	27.0 ± 8.2	24.4 ± 2.9
GFRm (mL/min/1.73m2)	53.5 ± 21.4	87.1 ± 5.4
Serum calcium (mmol/L)	2.4 ± 0.1	2.37 ± 0.1
Serum phosphorus (mmol/L)	1.1 ± 0.2	ND
Serum parathyroid hormone (pg/mL)	37.5 ± 32.5	29.5 ± 9.1
Serum bone alkaline phosphatase (µg/L)	12.4 ± 7.6	ND
Serum 25 OH vitamin D (ng/mL)	28.9 ± 10.7	28.8 ± 6
Serum free 25 OH vitamin D (pg/mL)	6.0 ± 2.1	6.6 ± 1.4
Free 25(OH)D/25(OH)D ratio	0.2 ± 0.06	0.2 ± 0.05

Figure 1. Free 25(OH)D vs 25(OH)D

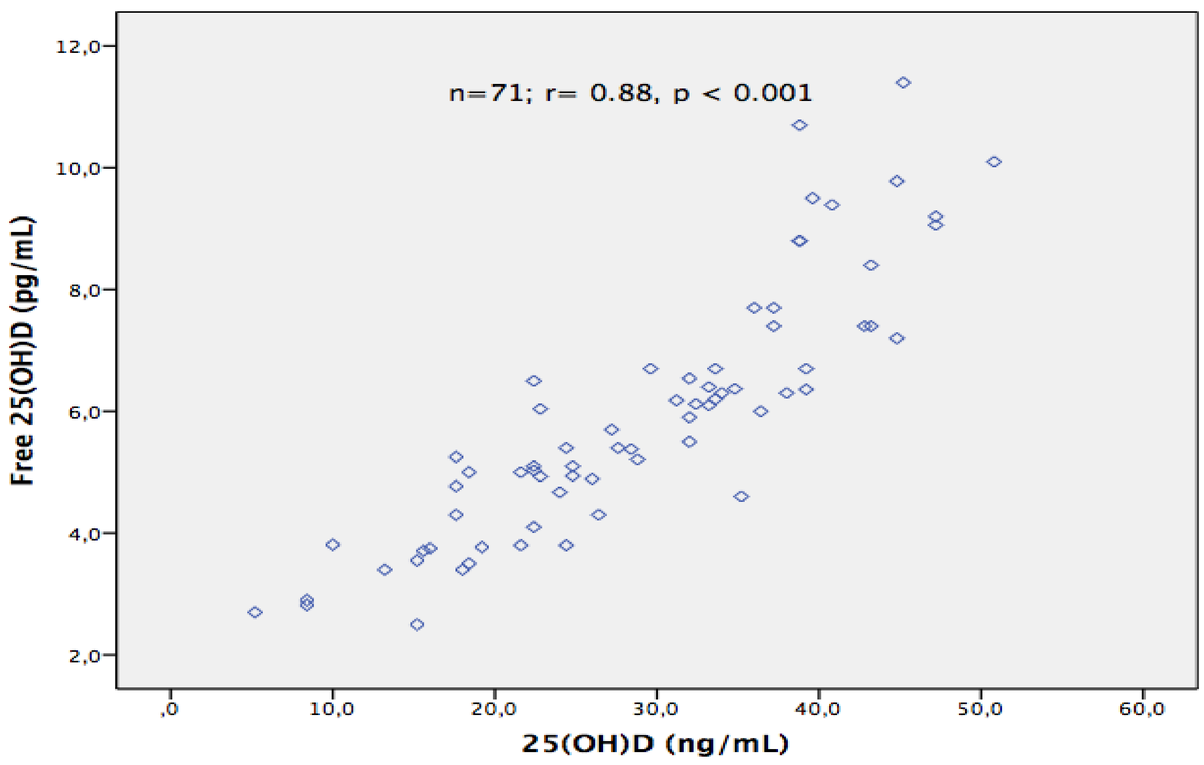
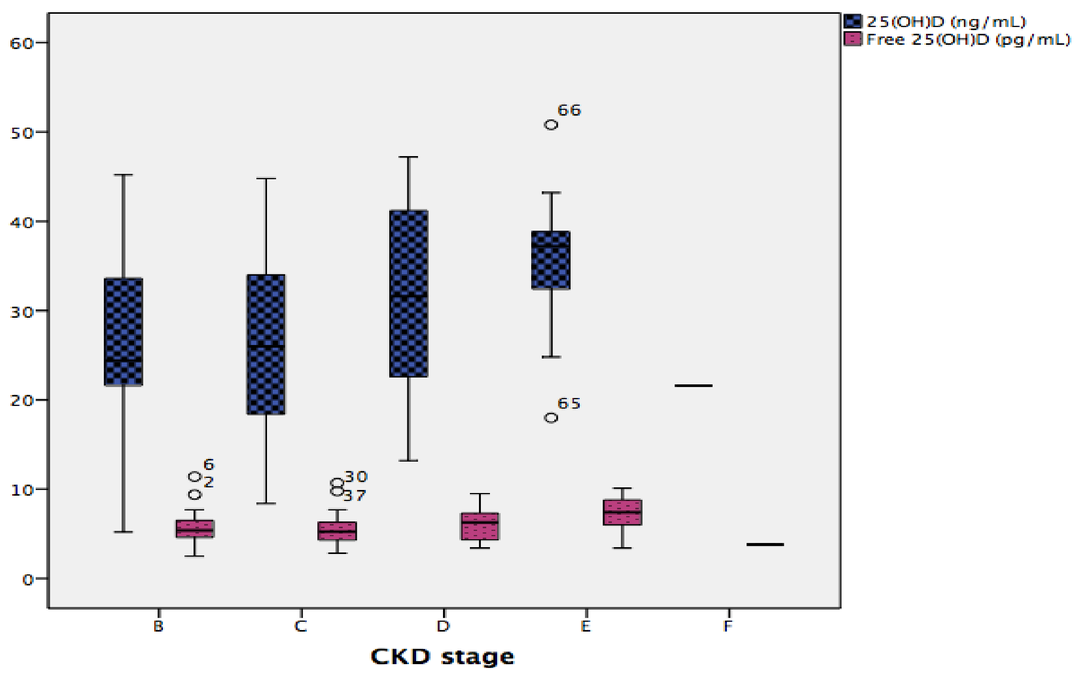


Figure 2. Free 25(OH)D and 25(OH)D levels depending on CKD stage.



Conclusion:

This is the first study about free 25(OH)D in CKD. Free 25(OH)D does not depend on GFR and does not correlate with bone biomarkers. This study provides a critical evidence of a potential **mechanism regulating free 25(OH)D levels**. Free 25(OH)D could be considered as a **better reflection of vitamin D action** in patients without vitamin D deficiency.

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