Evaluation of Vitamin D Levels and Outcomes in Patients on Hemodialysis in Fraser Health – A Retrospective Health Record Review

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INTRODUCTION

- There are no clear guidelines for the management of vitamin D deficiency in hemodialysis (HD) patients and no established 25-hydroxyvitamin D [25(OH)D] target levels in this population
- KDIGO guidelines suggest measuring 25(OH)D levels in CKD G3a to G5D and treating according to the recommendations outlined for the general population (Grade 2C: suggestion based on low quality evidence)
- The cost of a 25(OH)D level in British Columbia is $61.32
- 25(OH)D levels are ordered case-by-case within Fraser Health (FH) HD units
- The purpose of this study was to characterize current practice of ordering and managing 25(OH)D levels within FH HD units

OBJECTIVES

- **Primary:**
  - Characterize the reason for vitamin D levels in HD patients
  - Evaluate actions, if any, taken on low vitamin D levels
  - Determine the effect of vitamin D loading doses on chronic kidney disease mineral bone disease (CKD-MBD) markers
  - Compare the change, if any, in CKD-MBD markers between those that received vitamin D loading doses and those that did not
- **Secondary:**
  - Evaluate whether low vitamin D levels are correlated with abnormal CKD-MBD markers

METHOD

- **Study Design:**
  - Retrospective chart review from January 2018 to December 2020
- **Inclusion Criteria:**
  - Adults (≥18 years old)
  - FH HD patients with vitamin D level [25(OH)D] drawn within timeframe
- **Exclusion Criteria:**
  - Peritoneal dialysis at the time vitamin D level was drawn
  - HD started after vitamin D level was drawn
  - Missing baseline labs
  - Transfer to different health authority
- **Statistical Analysis:**
  - Descriptive statistics
  - Independent sample t-test to compare mean change in CKD-MBD parameters in patients that received a vitamin D load vs. those that did not
  - ANOVA to compare CKD-MBD parameters between low, normal and high vitamin D levels

RESULTS

Table 1: Baseline characteristics of patients

Age, mean years ± SD	64.9 ± 15.7
Male, n (%)	52 (51)
Dialysis vintage, mean days ± SD	1642 ± 2293
BMI (kg/m^2), mean ± SD	27.5 ± 8.1
Comorbidities	
Hypertension, n (%)	91 (89.2)
Diabetes, n (%)	55 (53.9)
Dyslipidemia, n (%)	47 (46.1)
Coronary artery disease, n (%)	27 (26.5)
Congestive heart failure, n (%)	22 (21.6)

Figure 1: Reason for ordering a 25(OH)D level (n=102)

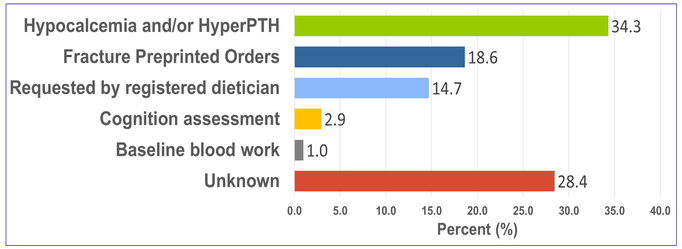

Figure 2: Baseline 25(OH)D level

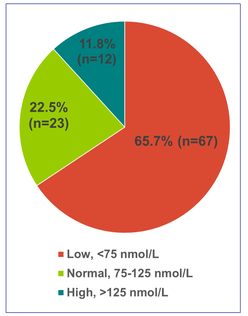

Figure 3: Vitamin D load

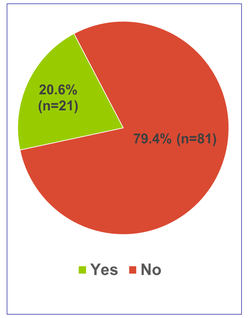

Figure 4: 25(OH)D level at 3 and 6 months post-load

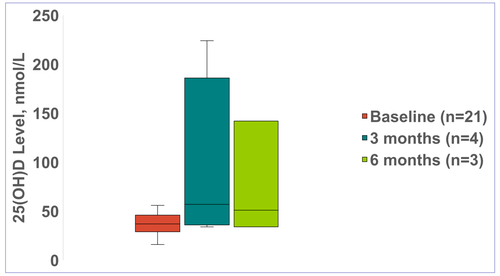

Table 2: Independent samples t-test analysis of change in CKD-MBD parameters

		No Vitamin D Load	Vitamin D Load	
CKD-MBD Parameter	**Time from Baseline, months**	**Mean ± SD**	**Mean ± SD**	**p-value**
Ca, mmol/L	3	0.07 ± 0.20	0.08 ± 0.19	0.95
	6	0.01 ± 0.21	0.07 ± 0.22	0.26
PO_4, mmol/L	3	0.09 ± 0.45	0.10 ± 0.41	0.86
	6	0.10 ± 0.53	0.05 ± 0.41	0.68
iPTH, pmol/L	3	-10.13 ± 34.73	-4.93 ± 40.13	0.57
	6	-10.41 ± 48.76	-3.08 ± 39.82	0.51
Alk Phos, U/L	3	-3.47 ± 44.40	-7.25 ± 49.06	0.74
	6	-3.14 ± 70.46	-4.30 ± 50.34	0.95

Table 3: ANOVA statistics of CKD-MBD parameters at low, normal and high 25(OH)D level

CKD-MBD Parameter	25(OH)D Level	Mean ± SD	p-value
Baseline Ca, mmol/L	Normal	2.17 ± 0.21	0.81
	Low	2.13 ± 0.28	
	High	2.14 ± 0.17	
Baseline PO_4, mmol/L	Normal	1.50 ± 0.56	0.17
	Low	1.65 ± 0.58	
	High	1.34 ± 0.50	
Baseline iPTH, pmol/L	Normal	50.94 ± 38.56	0.32
	Low	69.78 ± 74.02	
	High	45.26 ± 59.45	
Baseline Alk Phos, U/L	Normal	100.57 ± 36.99	0.04
	Low	132.15 ± 78.93	
	High	86.67 ± 47.65	

CONCLUSIONS

- Hypocalcemia and/or hyperparathyroidism was the most common reason for ordering a vitamin D level, and many patients had no obvious documented reason for ordering a 25(OH)D level
- One-fifth of patients received a vitamin D loading dose, and many had incomplete follow-up
- There were a total of 11 different vitamin D regimens prescribed, with the most common being cholecalciferol 10,000 IU PO daily for 6 weeks
- No effect of vitamin D load seen on any CKD-MBD parameters, and no difference was seen when compared to patients that did not receive a load
- Only baseline alkaline phosphatase levels differed between groups with low, normal and high vitamin D. There was no difference seen in other baseline CKD-MBD parameters.
- More stringent criteria when ordering 25(OH)D levels is warranted to avoid unnecessary blood work and reduce cost and workload of healthcare system

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