246

# Evaluating the impact of routine colecalciferol on secondary hyperparathyroidism: are renal guidelines missing something?

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Background
Vitamin D deficiency and insufficiency (serum 25(OH)D <30nmol/L and <75nmol/L respectively) is prevalent in haemodialysis patients and is associated with secondary hyperparathyroidism (SHPT). Lack of renal 25-hydroxyvitamin D-1α-hydroxylase (CYP27B1) for the conversion of 25(OH)D to active 1,25(OH)D is well acknowledged in end stage renal disease (ESRD) with the routine use of active vitamin D analogues. However, this overlooks 25(OH)D deficiency. Following the development of a new local clinical guideline, our Trust introduced colecalciferol supplementation to all in-centre haemodialysis patients as part of standard routine care. Colecalciferol supplementation was given to replete serum 25(OH)D to ≥75nmol/L as follows: serum 25OHD <50nmol/L repletion dose of 40,000IU weekly for 3 months, ≥50nmol/L maintenance dose of 20,000IU fortnightly, >150nmol/L stop and recheck in 3 months.

Aim
To assess whether increased serum 25(OH)D reduces parathyroid hormone (PTH) levels, measured by a reduction in mean serum intact PTH.

Method
All in-centre haemodialysis patients at our Trust were included in this study (n=350). Retrospective data looking at PTH levels was collected for 12 months prior to the introduction of colecalciferol (T-12 to T-1). The same data was collected prospectively for 15 months post introduction of colecalciferol (T0 to T15). This allowed 3 months to achieve serum 25(OH)D repletion, followed by 12 months post repletion (T4 to T15). Patients with insufficient data, and those that had a parathyroidectomy prior to, or during the study, were excluded. The number included in the final analysis was 280. Serum calcium and 25(OH)D were also collected. NHS ethical approval was received. Whole cohort, and grouped analysis was carried out using a related samples Wilcoxon signed rank test to compare mean PTH pre (T-12 to T-1) with mean PTH post (T4 to T15) serum 25(OH)D repletion. Data were grouped, according to mean PTH levels pre vitamin D supplementation (T-12 to T-1), as follows: on target (8.4-37.8pmol/L), high (37.9-85pmol/L) and very high (>85pmol/L), Data shown is mean±SD.

Results
Prior to vitamin D supplementation (T-12 to T-1) the whole cohort mean PTH was 40.3±37.5pmol/L; following the introduction of vitamin D supplementation (T4 to T15) this reduced to 36.7±34.8pmol/L (ns). The grouped analysis revealed no difference in the patients that had on target mean PTH levels but a significant reduction in PTH was seen in the high and very high PTH groups: 52.2±13.5pmol/L vs. 46.5±24.3pmol/L $p<0.05$, and 130.2±26.7pmol/L vs. 92.9±59.8pmol/L $p<0.001$ respectively. Colecalciferol supplementation effectively increased serum 25(OH)D from 27.4±25.3nmol/L at T0 to 120.0±27.1nmol/L at T15 ($p<0.0001$). Mean serum calcium increased from 2.29±0.13mmol/L (T-12 to T-1) to 2.35±0.13mmol/L (T4 to T15) ($p<0.0001$) but remained well within target range. No hypercalcaemia was directly associated with colecalciferol supplementation.

Conclusion

The vitamin D supplementation guideline developed for haemodialysis patients at our Trust, is both effective and safe. This study indicates that patients with the highest serum PTH levels are likely to have the most significant PTH reduction following normalisation of serum 25(OH)D. The use of colecalciferol concurrently with active vitamin D analogues is shown to be safe and may prove useful in aiding the management of SHPT.