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Hypovitaminosis D in patients on long-term parenteral nutrition

C. T. Tee, A. N. Milestone, A. U. Murugananthan, D. Bernardo and S. M. Gabe
Intestinal Failure Unit, St. Mark's Hospital, London HA1 3UJ, UK

Emerging evidence shows that vitamin D is not only important for bone integrity but also has immunomodulatory properties. The lowest quartile of 25-hydroxyvitamin D (25-OHD) levels (<45 nmol/l) is independently associated with all-cause mortality in the general population[1]. Patients with intestinal failure (IF) requiring long-term parenteral nutrition (PN) are susceptible to hypovitaminosis D as a result of inadequate absorption, suboptimal vitamin D dietary intake, advanced age, lack of exposure to UVB light and medication influencing vitamin D metabolism. In our institution Cernevit® is added to the PN as required.

We aimed to establish the prevalence of hypovitaminosis D in our tertiary long-term PN patient population. Patients were identified using the St. Mark's IF database. Retrospective data of 25-OHD levels, patient demographics, IF aetiology, month of blood test and vitamin D supplementation prescription were obtained. Cernevit® provided low-dose (<400 IU/d) supplementation and intramuscular (IM) injection of 150000 IU vitamin D every 3 months provided a higher dose. Total 25-OHD is defined as severely deficient (<25 nmol/l), deficient (25–50 nmol/l), insufficient (50–75 nmol/l) and adequate (>75 nmol/l).

One-hundred-and-ninety-nine PN patients were identified (134 female, median age was 53). The mean duration of PN was 70 months. The mean 25-OHD level was 61.6±36.5 nmol/l. Vitamin D levels were independent of age ($P = 0.37$), sex ($P = 0.52$) and IF aetiology ($P = 0.13$). Vitamin D levels were higher in summer (June–November, 71.3±40.8 nmol/l) compared to the winter period (December–May, 54.7±31.6 nmol/l) ($P = 0.0015$). One-hundred-and-forty-three (71.9%) patients had vitamin D levels below 75 nmol/l; 26.6% were insufficient, 37.2% were deficient and 8% were severely deficient. One-hundred-and-sixty-two patients received low dose of vitamin D, 13 received high dose of vitamin D and 24 had no supplements. No significant differences were seen between low-dose and un-supplemented groups ($P > 0.05$). High-dose supplementation significantly increased vitamin D levels ($P < 0.05$) but the levels were still below the recommended level.

	Patient No.	Vitamin D levels median (95% CI)
On high-dose supplement	13	70.0 (55.2, 108.6) *
On low-dose supplement	162	52.0 (54.8, 65.4) *
On no supplement	24	58.0 (41.9, 80.1)

*$P = 0.0226$ (comparing high- and low-supplement groups).

Hypovitaminosis D (<75 nmol/l) is common in patients on long-term PN. Gender, age and IF aetiology were not associated with vitamin D status, but a seasonal variation was seen. The current available intravenous vitamin preparations do not contain an adequate dose of vitamin D for patients on PN. IM supplementation improves vitamin D levels but doses higher than 150 000 IU every 3 months is required in this population.

1. Melamed ML, Michos ED, Post W *et al*. (2008) 25-Hydroxyvitamin D levels and the risk of mortality in the general population. *Arch Intern Med* **168**, 1629–1637.