Efficacy of High versus Conventional Dose of Oral Ergocalciferol Supplementation on Serum 25-hydroxyvitamin D and Inflammatory Cytokines in Dialysis Patients: Multicenter, Randomized, Controlled Study

Wittaya Siricheepchaiyan1 Amnart Chaiprasert1 Theerasak Tangwonglert1 Bancha Satriapoj1 Naowanit Nata1 Ouppatham Supasyndh1

1Division of Nephrology, Department of Medicine, Phramongkutklao Hospital and College of Medicine, Bangkok 10400, Thailand

Background: Vitamin D insufficiency alters innate and adaptive immune function, leading to the increase of inflammatory cytokine production. Long-term dialysis is a chronic inflammatory state with high prevalence of vitamin D insufficiency. Trials examining the efficacy and dosage of ergocalciferol supplement in end stage renal disease (ESRD) on dialysis have been limited.

Objective: To evaluate the efficacy of high-dose compared with conventional-dose ergocalciferol supplement for the achievement of vitamin D sufficiency and decrease circulating inflammatory cytokines in long-term dialysis patients.

Methods: A multicenter, randomized, controlled trial was conducted in ESRD on hemodialysis with serum 25-hydroxyvitamin D (25(OH) D) level<30 ng/mL. The conventional-group (N=35) and the high-dose group (N=35) were treated with ergocalciferol according to the K/DOQI guidelines and double dosage of ergocalciferol from recommendation for 8 weeks, respectively. The main outcomes were measured by serum 25(OH) D, interleukin-6 (IL-6), and absolute lymphocyte counts.

Results: At the end of 8-week study, there was a statistically significantly greater increase of mean serum 25(OH)D levels in the high-dose group compared with the conventional-dose group (17.8 ng/mL (95%CI 15.8 to 19.7) vs 9.2 ng/mL (95%CI 7.4 to 11.1), P<0.001). The high-dose group had also higher achievement of vitamin D sufficiency (25(OH) D level >30 ng/mL) than the conventional-dose group (97% vs 76%, P=0.012). There was a trend toward lower serum IL-6 levels in the high-dose group (-0.24 pg/mL (IQR -3.27 to 1.13), P=0.772), with a statistically significance lower serum IL-6 levels in the subgroup who had baseline serum 25(OH) D level <21 ng/mL (-2.67 pg/mL (IQR -6.56 to -0.17), P=0.039). The high-dose group also had higher hemoglobin levels, higher absolute lymphocyte counts, and lower parathyroid hormone levels after treatment. However, there were no significant changes in the conventional-dose group. No difference was identified among patients in the high-dose and the conventional-dose groups in terms of adverse events.

Conclusion: Oral high-dose ergocalciferol supplement has achieved higher vitamin D sufficiency than standard recommendation dose in ESRD patients on dialysis. There are additional beneficial effects in reducing the inflammatory cytokines and improving anemia and hyperparathyroidism.

Keywords: Ergocalciferol, End stage renal disease, Hemodialysis, Vitamin D insufficiency