

Abstract

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Responses of parathyroid hormone to vitamin D supplementation: A systematic review of clinical trials.

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BACKGROUND: The beneficial bone effects of vitamin D supplementation have been attributed to suppression of secondary hyperparathyroidism by 25-hydroxyvitamin D (25-OHD) levels at least 50nmol/l.

OBJECTIVE AND METHODS: In this systematic review, we have analyzed the results of 52 clinical trials, including 72 intervention groups and 6290 patients, on vitamin D supplementation in order to evaluate the experimental evidence and the effects of age and chronic immobility on responses of parathyroid hormone (PTH). The papers for this systematic review were selected through a search in PubMed and through a review of the reference lists of articles.

RESULTS: Negative logarithmic ($R(2)=0.318$, $p<0.001$) and linear ($R(2)=0.294$, $p<0.001$) correlations were found between 25-OHD and PTH levels, when all pre- and post-trial values were scattered. Negative linear ($R(2)=0.385$, $p<0.001$) and logarithmic ($R(2)=0.406$, $p<0.001$) correlations were also found between the changes in 25-OHD and PTH levels. Age correlated negatively with changes in PTH ($r=-0.476$, $p<0.001$). The vitamin D supplementation of the chronically immobile patients resulted in a smaller decrease in PTH levels (-8.4 vs. -17.4%, $p<0.001$) despite a larger increase in 25-OHD levels (187.2% vs. 109.8%, $p<0.001$). According to the multiple regression analysis the changes in PTH were independently predicted by pre-trial PTH, changes in 25-OHD, age and chronic immobility, explaining 53.2% ($R(2)=0.532$) of the variation.

CONCLUSION: This meta-analysis shows that responses of PTH to vitamin D supplementation are not only determined by the baseline PTH levels and changes in vitamin D status, but also by age and mobility of the patients. Our results also suggest that PTH decreases quite linearly during vitamin D supplementation at any given 25-OHD level. Longitudinal vitamin D supplementation studies on populations with wide range of mobility and age are needed to further elucidate their confounding effects. In determining the sufficient doses of vitamin D supplementation and adequate 25-OHD levels, these confounding effects and the inter-individual variation in responses of PTH to vitamin D supplementation should be taken into account.

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