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Editorial

Vitamin D Deficiency and Cardiovascular Diseases: The Causality or Association?

Vitamin D is made from cholesterol (mainly ergocalciferol (vitamin D2) or Cholecalciferol (Vitamin D3), and metabolized first to 25 hydroxyvitamin D (25(OH)D), then to the hormonal form 1,25-dihydroxyvitamin D (1,25(OH)2D). It exerts its effect via vitamin D receptor (VDR) and regulates hundreds of genes in a cell-specific fashion. Vitamin D adequacy is often determined by measurement of the (25(OH)D) concentration in the blood. Vitamin D deficiency is a health problem worldwide in all age groups, even in those residing in countries with low latitude. For example, the prevalence of vitamin D insufficiency was 5–73% in Asia-pacific area (serum 25(OH)D < 30 ng/ml).[1]

The identification of the vitamin D receptor in the cardiac muscle, immune and endothelial cell raised interest in the potential cardiovascular effects of vitamin D. In current issue, Dr. Yu Yang et al. investigated the relationship between serum level of (25(OH)D), ambulatory arterial stiffness index (AASI), and other parameters from ambulatory blood pressure monitoring in 102 hypertensive elderly. The multivariate liner regression analysis showed that 25(OH)D and 24-h average pulse pressure were independently related to AASI. The result was consistent with the previous study.[2]

The dynamic relationship between 24-h diastolic and systolic ambulatory blood pressure (BP) expressed by AASI has been introduced as a novel measure of arterial function and may predicts future cardiovascular events.[3] However, the current study suggested the association between (25(OH)D level and AASI, but the causative role of vitamin D was not clear. There is non-linear relationship for vitamin D and risk of cardiovascular events. Deficient circulating (25(OH)D < 15 ng/ml) are independently-associated with increased cardiovascular diseases, but higher serum levels of (25(OH)D > 60 ng/ml) are also related to cardiovascular risk.[4] Concomitant use of vitamin D and calcium supplement may impose greater risk of arterial calcification and urolithiasis on the elderly with renal insufficiency. Furthermore the currently available evidence does not strongly support cardiovascular benefits of generalized vitamin D supplementation with the commonly used doses.[5] The recent randomized, double-blind, placebo-controlled trial in United Kingdom also revealed that high dose supplement of Vitamin D (daily 4000IU or 2000IU) did not correlate with any significant effect on blood pressure or arterial stiffness.[6]

Many observational studies showed the association between vitamin D deficiency and risk of cardiovascular diseases, but the biological mechanism of the causality remained to be elucidated. Besides limited sunlight exposure, gastrointestinal malabsorption, hepatic diseases, renal insufficiency and obesity are risk factors of circulating vitamin D deficiency. These factors may also influence the risk of cardiovascular problems. The supplement of vitamin D from a cardiovascular health perspective still is controversial despite biological plausibility.

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