

Vitamin supplements and cardiovascular diseases

To the Editor

We read 2 recently published articles on potential role of vitamins on cardiovascular diseases.^{1,2} These timely publications provided useful information on how hypovitaminosis-D can affect pro-inflammatory factors to influence progression of cardiovascular diseases,¹ and also raised the questions of the utility of anti-oxidant vitamins in delaying cardiovascular diseases.² We want to emphasize that disproportionate use of vitamin-D may induce cardiovascular calcification, through abnormal regulation of calcium and phosphate homeostasis. Recent studies have clearly demonstrated that vitamin-D can exert opposing effects in the intestine and kidney to maintain phosphate balance. Vitamin-D can increase intestinal phosphate absorption, while reduce renal phosphate reabsorption, by inducing fibroblast growth factor (FGF) 23-klotho system.^{3,4} Such physiologically opposing effects of vitamin-D to maintain phosphate balance may be impaired by uncontrolled consumption of vitamin-D supplements. Serum phosphate level is an important in vivo determinant of vascular calcification. A recent study has convincingly shown that lowering serum phosphate levels can reduce or eliminate soft tissue and vascular calcification, even in the presence of extremely high serum levels of calcium and vitamin-D.⁵ This in vivo genetic study suggests that reducing "phosphate burden" should be a therapeutic priority for minimizing the risk of cardiovascular calcification.⁵ Since vitamin-D can regulate phosphate balance, random use of vitamin D without specific objectives may induce unexpected complications, as cardiovascular calcification.

Given the fact that elderly peoples are more likely to be affected by hypovitaminosis-D, a vitamin-D supplementation is a sensible approach to lessen the risk for osteoporosis and metabolic bone diseases. Any such recommendation, however, should be considered after carefully examining the food habits and other herbal supplements used by the individuals. Many herbal supplements, foods and drinks are rich in phosphate content. Of particular interest, soft drinks such as Coca-Cola and Pepsi have very high content of phosphate. Unrestricted consumption of soft drinks can increase phosphate levels in the blood, and higher phosphate levels usually pull out the calcium from the bones to induce skeletal abnormalities, including osteoporosis. Studies have found association between osteoporosis and an increased rate of aortic calcification.⁶ Moreover, high phosphate and high sugar containing soft drink intake has linked to obesity.⁷ In Saudi Arabia, one in every 6 children aged 6-18 years old is obese.⁸ It is

worth mentioning that obese children are more likely to develop cardiovascular complications in adulthood as compared with their lean counterparts.

Finally, as Dr. El-Sabban correctly recommended in his article,² healthy lifestyle and daily consumption of adequate amount of diet that contains required amount of calories, vitamins and minerals should reduce the requirements of vitamin supplements, as the usefulness of such supplements in cardiovascular diseases is yet to be proven.

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Reply from the Author

I read the interesting comment by Dr. Shaker and colleagues. In response: Vascular calcification (VC) as a predictor of atherosclerosis and poor survival is a complex process.⁹ Hyperphosphatemia and hypercalcemia play a role in this process. The toxic effect of vitamin D on vasculature and promoting of calcification have been known previously, but in all studies, these effects related to supraphysiologic doses of vitamin D.^{10,11} We know that calcitriol suppresses inflammatory cytokines, inhibits the activity of DBP on vascular smooth muscle cells (VSMCs) and reduces the expression of MMP-9,¹¹ and also up-regulates the expression of anti-coagulant protein thrombomodulin.¹² In one study, both high and low levels of calcitriol (>150 and <40 pmol/li) were associated with higher carotid-intima-media thickness than control groups.¹³ So, it seems that a normal range of 1,25 OH D₃ is necessary for cardiac health and we can use vitamin D analogues that selectively activate specific vitamin D receptors (VDRs) with less calcemic and phosphatemic effect than non-selective VDR activators.¹⁴

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References

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