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Editorial

Does Vitamin D Supplementation Reduce the Risk of Cardiovascular Disease or is This a Myth?

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Editor

We have had sunny summer months thanks to the geographic location of our country. Although we have just entered the first month of autumn, we still continue to have sunny weather. Physicians dealing with rheumatology immediately think of vitamin D (vit D) when they hear the word sun. The effects of vit D supplements on human health are not only the subject of much interest in the medical community, but the general public also a growing desire to learn more about this topic.

Vitamin D is important for bone mineralization, but it also has many other functional effects. Metabolic bone diseases, such as osteoporosis and osteomalacia, are often seen after menopause or later in life and constitute some of the most frequently encountered diseases in the rheumatology field where vit D supplements are widely utilized. Cardiovascular diseases are also often seen at these same stages in life. Therefore, knowing the effects of vit D supplements on cardiovascular diseases is important. In one of the past issues of our journal, in his editorial, Gök[1] pointed out the cardiovascular risks that occur when taking calcium supplements with or without vit D. To further explore this subject, I aim to outline our current knowledge regarding the effects of vit D supplements on the cardiovascular system.

Vitamin D is a fat-soluble vitamin that functions as a hormone in the body to regulate calcium metabolism, and it works in conjunction with parathyroid hormones to control the blood concentrations of calcium. Although it can be found in some foods, most vit D is obtained by exposure to sunlight. Factors such as ethnicity, gender, weight, age, skin color, season, style of clothing, and use of sunscreens along with the altitude and latitude where a person lives affect vit D levels.[2]

Since vit D receptors (VDRs) are found in many tissues, there has been growing interest in research concerning the potential functions of vit D other than how it affects bones. All vit D metabolites bind the VDRs, but most of the biological effects are likely mediated by calcitriol due to its greater receptor affinity.[3] Although the mechanisms have not yet been clearly revealed, it is believed that cardiocytes, vascular endothelial cells, inflammatory cytokines, the rennin-angiotensin-aldosterone system (RAAS), and glycemic control receive some positive effects of vit D since they have a relationship with the cardiovascular system.[3] For example, a study conducted on animals revealed that neonatal rat hearts were isolated from the ventricular myocytes and that calcitriol regulated the synthesis phase of the cell cycle.[4]

In addition, according to data in one cross-sectional study,[5] low vit D levels are associated with the cardiovascular disease risk factors related to hypertension, obesity, diabetes mellitus (DM), metabolic syndrome, and cardiovascular disease events. In the Third National Health and Nutrition Examination Survey (NHANES III), the prevalence of hypertension, DM, obesity, and high serum triglyceride levels was significantly higher in the lowest quartile compared with the highest quartiles of serum 25-hydroxyvitamin D [25(OH)D].[6] Thus, vit D deficiency has been identified as a potential risk factor for cardiovascular disease.

The topic of anti-inflammatory pathogenesis in cardiovascular diseases is another issue that should be examined. Lower C-reactive protein (CRP) and erythrocyte sedimentation rate (ESR) levels have been found in cardiovascular and rheumatologic patients

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who either had higher levels of vit D or were taking vit D supplements.[7,8] Furthermore, according to Pérez-Castrillón et al.[9] statins, which are frequently used in the treatment of cardiovascular diseases, are believed to have an effect on vit D receptors because vit D levels increase in the patients who were taking them.

Additionally, the results of a large prospective study by Melamed et al.[10] (median follow-up of 8.7 years) showed that the lowest quartile of 25(OH)D was independently associated with all-cause mortality in the general population, and a similar trend, although not statistically significant, was observed for increased cardiovascular mortality.

A meta-analysis of 18 randomized clinical trials by Autier et al.,[11] which included the Women's Health Initiative, found that fewer deaths occurred in participants randomized to vit D supplementation compared with those randomized to a placebo.[11]

In a more recent meta-analysis of prospective studies, the results of over 65,000 subjects were evaluated to explore the relationship between vit D status and cardiovascular disease risk, and the authors found an inverse relationship between the levels of vit D and the future risk of cardiovascular disease endpoints, including coronary heart disease, stroke, and total cardiovascular disease mortality.[12]

In light of these findings, it would be easy to assume that vit D supplements are necessary, but early conclusions can be misleading since research exists that indicates just the contrary. For example, regarding the effect of vit D supplement on glycemic control, some smaller, non-randomized clinical trials have shown promising improvement in glycemic control with vit D therapy, but a recent Endocrine Society statement emphasized the lack of solid evidence supporting the benefits of vit D therapy for DM.[3]

Moreover, recently completed larger studies focusing on hypertension control have revealed conflicting results concerning the effects of vit D supplements,[3] and in a new review paper by Bhan et al.[13] they argued that vit D supplements have no positive clinical effects other what is already known to take place on the bones.

This short summary should be sufficient to display the complex nature of vit D supplementation. For those who are more into details, the question regarding how vit D receptor polymorphisms affect this whole issue should also be investigated.[5] To be sure, this topic is still a challenging one that will require much more research in the future.

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