Vitamin D concentrations, endothelial progenitor cells, and cardiovascular risk factors

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Our study aimed to establish the association of vitamin D status with the level of circulating endothelial progenitor cells (EPCs) and circulating angiogenic cells (CACs) and to demonstrate the effect of vitamin D on the level of lipoproteins responsible for increased cardiovascular risk and high blood pressure. 41 healthy adults were selected. EPCs were defined as CD34+/KDR+ cells, and CACs were defined as cells that expressed endothelial markers after incubation of mononuclear blood cells with endothelial growth factors during 5 days. We found a positive association between EPCs, CACs and the level of vitamin D and an inverse correlation between several subclasses of lipoproteins. The level of vitamin D higher than 40 ng/ml demonstrated a positive effect on regulation of blood pressure, and there was significant difference in cholesterol/HDL ratio, very low-density lipoproteins, and triglycerides for groups of subjects with varying levels of vitamin D.

KEY WORDS: Endothelial progenitor cells, Vitamin D, cardiovascular risk factors.

The purpose of this study was to establish the association of vitamin D status with the level of circulating endothelial progenitor cells (EPCs). Vitamin D deficiency is a common condition, present in approximately 30% to 50% of the general population. Low 25-hydroxyvitamin D levels may have an effect on cardiovascular health, cancer, and diabetes. 1-9 Studies on the connection between ischemic heart disease, hypertension and vitamin D are conflicting.

Some studies found an inverse relationship between levels of the active form of vitamin D, blood pressure, and plasma renin activity. 10, 11 Another study reported a positive association. 12 Because the vitamin D receptor (VDR) is present in most cells, vitamin D has a wide range of therapeutic and health-related benefits. The active form of vitamin D3 is a steroid hormone shown to regulate more than 60 genes. 13, 14 The translocation of 1α,25(OH)2D3 into cells, where it binds with high affinity to vitamin D nuclear receptors, results in altering rates of gene expression. By this pathway, the active form of vitamin D influences a number of genes relevant to arterial wall functions. These include VEGF, matrix metalloproteinase, myosin, and structural proteins. Vitamin D receptors are densely distributed in the endothelium, and vitamin D3 modulates vascular tone by reducing calcium influx into the endothelial cells. 1,25(OH)2D is a very effective modulator of the immune system. In animal models, it has been demonstrated that pretreatment with 1,25(OH)2D is effective in preventing the onset of type 1 diabetes, multiple sclerosis, rheumatoid arthritis, and Crohn’s disease. 15

Our goal was to prove that optimal levels of vitamin D could be correlated with the increased number of circulating EPCs and angiogenic cells. The number of

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