

Effect of Vitamin D Deficiency and Replacement on Endothelial Function in Asymptomatic Subjects

Ozlem Tarcin, Dilek Gogas Yavuz, Beste Ozben, ed.

Section of Endocrinology and Metabolism (O.T., D.G.Y., D.Y., S.S., O.D., S.A.), Departments of Cardiology (B.O.) and Biochemistry (A.Te.), Vocational School of Health Professionals (A.V.O., M.Y.), and Department of Internal Medicine (A.To.), Marmara University School of Medicine, 34060 Istanbul, Turkey

Abstract

Context: Vitamin D receptors are present in many tissues. Hypovitaminosis D is considered to be a risk factor for atherosclerosis.

Objective: This study explores the effects of vitamin D replacement on insulin sensitivity, endothelial function, inflammation, oxidative stress, and leptin in vitamin D-deficient subjects.

Design, Setting, and Patients: Twenty-three asymptomatic vitamin D-deficient subjects with 25-hydroxyvitamin D [25(OH)D] levels below 25 nmol/liter were compared with a control group that had a mean 25(OH)D level of 75 nmol/liter. The vitamin D-deficient group received 300,000 IU im monthly for 3 months. The following parameters were evaluated before and after treatment: vitamin D metabolites, leptin, endothelial function by brachial artery flow mediated dilatation (FMD), insulin sensitivity index based on oral glucose tolerance test, and lipid peroxidation as measures of thiobarbituric acid reactive substances (TBARS).

Results: FMD measurements were significantly lower in 25(OH)D-deficient subjects than controls ($P = 0.001$) and improved after replacement therapy ($P = 0.002$). Posttreatment values of TBARS were significantly lower than pretreatment levels ($P < 0.001$). A positive correlation between FMD and 25(OH)D ($r = 0.45$; $P = 0.001$) and a negative correlation between FMD and TBARS ($r = -0.28$; $P < 0.05$) were observed. There was a significant increase in leptin levels after therapy, and the leptin levels were positively correlated with 25(OH)D levels ($r = 0.45$; $P < 0.05$).

Conclusions: This study shows that 25(OH)D deficiency is associated with endothelial dysfunction and increased lipid peroxidation. Replacement of vitamin D has favorable effects on endothelial function. Vitamin D deficiency can be seen as an independent risk factor of atherosclerosis. Hypovitaminosis D-associated endothelial dysfunction may predispose to higher rates of cardiovascular disease in the winter.