

# Abstract

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## Relation of vitamin D deficiency to cardiovascular risk factors, disease status, and incident events in a general healthcare population.

Anderson JL, May HT, Horne BD, Bair TL, Hall NL, Carlquist JF, Lappé DL, Muhlestein JB; Intermountain Heart Collaborative (IHC) Study Group.

Cardiovascular Department, Intermountain Medical Center, Murray, Utah, USA.

**OBJECTIVE:** Vitamin D recently has been proposed to play an important role in a broad range of organ functions, including cardiovascular (CV) health; however, the CV evidence-base is limited.

**METHODS:** We prospectively analyzed a large electronic medical records database to determine the prevalence of vitamin D deficiency and the relation of vitamin D levels to prevalent and incident CV risk factors and diseases, including mortality. The database contained 41,504 patient records with at least one measured vitamin D level.

**RESULTS:** The prevalence of vitamin D deficiency ( $\leq 30$  ng/ml) was 63.6%, with only minor differences by gender or age. Vitamin D deficiency was associated with highly significant ( $p < 0.0001$ ) increases in the prevalence of diabetes, hypertension, hyperlipidemia, and peripheral vascular disease. Also, those without risk factors but with severe deficiency had an increased likelihood of developing diabetes, hypertension, and hyperlipidemia. The vitamin D levels were also highly associated with coronary artery disease, myocardial infarction, heart failure, and stroke (all  $p < 0.0001$ ), as well as with incident death, heart failure, coronary artery disease/myocardial infarction (all  $p < 0.0001$ ), stroke ( $p = 0.003$ ), and their composite ( $p < 0.0001$ ).

**CONCLUSION:** In conclusion, we have confirmed a high prevalence of vitamin D deficiency in the general healthcare population and an association between vitamin D levels and prevalent and incident CV risk factors and outcomes. These observations lend strong support to the hypothesis that vitamin D might play a primary role in CV risk factors and disease. Given the ease of vitamin D measurement and replacement, prospective studies of vitamin D supplementation to prevent and treat CV disease are urgently needed.

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