

ROLE OF VITAMIN D SUPPLEMENTATION AND DIABETIC PATIENTS

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Vitamins are a number of chemically unrelated families of organic compounds that cannot be synthesized by humans. Consequently, they must be obtained from the diet to prevent disorders of metabolism. Vitamins are classified as fat-soluble and water-soluble. Vitamin D, a fat-soluble compound, has an important role in the maintenance of organ systems.

The generic term, vitamin D, refers to metabolites and other analogues of these compounds with a four-ringed cholesterol backbone that are collectively known as calciferol. The absorption and metabolism of vitamin D is unique in the sense that it can be both synthesized in the skin due to sunlight exposure, specifically ultraviolet B radiation, and absorbed in the intestine as a result of dietary intake from such foods as fortified milk, fatty fish, cod liver oil, and eggs. Ultimately, vitamin D is metabolized in the proximal tubules of the kidney to form the physiologically active form of vitamin D, known as 1,25-dihydroxy-vitamin D (1,25(OH)₂-vitamin D).

In this physiologically active form, vitamin D is responsible for several different biologic activities. Perhaps the most well known function of vitamin D is to maintain calcium and phosphorus homeostasis and promote bone mineralization, thereby reducing the risk of osteoporosis. Additionally, recent evidence has suggested that vitamin D may play a role in the prevention of cancers, type 1 and 2 diabetes mellitus, and cardiovascular disease. Martins et al demonstrated that there was a significant association between low vitamin D levels and select cardiovascular disease risk factors (obesity, diabetes mellitus, and hypertension) in US adults, thereby calling into question the current recommendations on what constitutes the normal levels of vitamin D. In another study, Casteels et al were able to prevent the development of type 1 diabetes mellitus in animal models by administering 1,25-dihydroxyvitamin D₃. Later, it was determined in a separate study by Chiu et al that hypovitaminosis D is associated with insulin resistance and decreased β -cell function.

Despite these numerous proven and potential benefits, there still exists a large portion of the population

that remains deficient in vitamin D. This can result from a number of factors including: inadequate intake coupled with inadequate sunlight exposure, chronic renal disease, and gastrointestinal disease. Furthermore, hypovitaminosis D has been reported to be highly prevalent in patients with type 2 diabetes mellitus. In a recent study by Yoho et al vitamin D levels were tested in a nondiabetic group, a diabetic group without Charcot neuroarthropathy, and a diabetic group with Charcot neuroarthropathy. The results of the study demonstrated that the vitamin D levels in both the diabetic populations were significantly lower than the nondiabetic population.

There are 23.6 million people in the United States, or 8% of the population, who have diabetes. Approximately 60 to 70% of people with diabetes have mild to severe forms of nervous system damage. Although its role in diabetic neuropathic pain is uncertain, recent evidence has demonstrated that vitamin D is a neurotrophic substance and modulates neuromuscular function and neuronal growth and differentiation. Riaz et al were able to prevent neurotrophic deficits in streptozotocin-diabetic rats by orally administering a vitamin D₃ derivative.

Currently, there is no definitive treatment for diabetic peripheral neuropathy but rather only therapies targeted at relieving symptoms associated with neuropathic pain. Hypovitaminosis D, which is highly prevalent and underrecognized in diabetic patients with peripheral neuropathy, may be a contributing factor to diabetic peripheral neuropathy. Recently, Lee et al studied the effect of vitamin D supplementation on 51 diabetic patients with typical neuropathic pain. It was concluded that in addition to the beneficial effects of vitamin D on bone health and glycemic control and its low risk of harmful effects, vitamin D supplementation in vitamin D-insufficient patients may be an effective adjunct in treating diabetic peripheral neuropathy.

In conclusion, vitamin D supplementation in the diabetic population may prove to be an extremely useful tool in the armamentarium against diabetes mellitus.